



HOUSEFUL

D 3.1: Social engagement strategy for the co-creation of HOUSEFUL solutions as new services (version I)

WP3 – T3.1

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Versions

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Abstract

First and foremost, this deliverable is in draft version as two of the 4 Houseful sites are yet to be validated. Therefore, the data from these sites cannot be included in this document. A final version of this document will be submitted in Month 24.

This deliverable provides a preliminary approach on how to develop and implement an engagement strategy for the development of the Houseful project solutions and services (CEBOs). The main objective of this deliverable is to define the actions and activities that will be implemented in Task 3.2 (the process of co-creation through the implementation of workshops). The action and activities are based on the evidence gathered after consulting with the identified and targeted stakeholders. Therefore, this document also provides information on who these stakeholders are, how they have been identified and their role in the engagement process.

The evidence generated originates from the consultation process that the Houseful WP3 partners have implemented together based on the completion of a questionnaire and a series of in-depth interviews with the stakeholders. The analysis of these results are based on social analytical variables (mainly "effective engagement" and "co-management" and the Social Network Analysis method, for the configuration of the social structure.

The main results are: 1) the first map of stakeholder connections (for the two validated demo sites), 2) the identification and description of the specific ideas for the co-creation processes and, 3) a roadmap for the development of task 3.2 (the co-creation process).



1. Introduction

The housing sector is a major contributor to current global problems of resource depletion and climate change, representing one of the most important consuming sectors at EU level: 50% of all extracted materials, 40% of final energy consumption, 33% of water consumption and 33% of all produced waste. The lock-in to the linear business models of today is causing many environmental problems and is one of the major barriers in transition towards a circular economy. HOUSEFUL project proposes an innovative paradigm shift towards a circular economy for the housing sector by demonstrating the feasibility of an integrated systemic service composed of 11 circular solutions.

A large number of referenced case studies and innovative projects are focused on the new design of products, smart production in industries and energy efficiency processes. However, this transition has not yet taken place at all levels in the housing sector (energy, water, waste and materials). For that reason, a new circular thinking approach is required to enable better decision-making on the selection of circular solutions at different levels for all different stages of a building's life-cycle, promoting the participation and interaction among stakeholders in each stage for an optimal building's functionality and use of resources (water, waste, material and energy) in a co-creation process. The transition from linear to a circular business model in housing sector will massively contribute to a low-carbon urban economy in future green cities and the reduction of waste and GHG emissions, contributing to COP21 objectives and the achievement of goals proposed by the 2030 Agenda for Sustainable Development (United Nations, 2015).

HOUSEFUL proposes an innovative paradigm shift towards a circular economy for the housing sector. The main goal is to develop and demonstrate an integrated systemic service (HOUSEFUL Service) composed of 11 circular solutions co-created by stakeholders in current housing value chain. The HOUSEFUL Service will aim at the circular management and efficient use of water, waste, energy and material resources for all stages of European building's life-cycle.

In this sense, co-creation is an essential and transversal action for Houseful leading to effective engagement of the stakeholders. This should help to overcome cultural and social barriers associated with the circular management and use of water, waste, energy and material resources

This report is part of Work Package (WP) 3: Co-creation of Houseful services and more specifically Task 3.1 that aims to analyse and map the stakeholder's belief structures. Thus, relating to their underlying behaviour, attitudes, and societal concerns in order to address knowledge requirements for the demonstration and replication of the 11 HOUSEFUL solutions exploited as integrated services. This task leads to the achievement of engagement with local and regional stakeholders from the "FrontRunner" Buildings (FRB), also here named as demo sites, and to frame the process of co-creation of the proposed 11 HOUSEFUL Services according to their needs and behavioural patterns, making it feasible and realistic the co-creation of new Circular Economy Business Opportunities (CEBOs) from developed solutions, which forms part of Task 3.2.



This document provides a detailed review of the stakeholders' identification and analysis process for the different CEBOs and DEMO locations. This process resulted in the definition of a social engagement strategy that will assure proper co-creation actions during the project, establishing a clear roadmap for Tasks 3.2, as well as defining the basis for the demonstration of S2 solution.



2. Methodology

The aim of Task 3.1 was to develop the roadmap for the co-creation process. Therefore, the planned methodology was built upon this aim in implementing the co-creation process. The figure below details this procedure and plan for consultation actions in terms of tasks, resources and documents in this report and timing. Further details and specifications are included in section 5, together with roles and responsibilities.

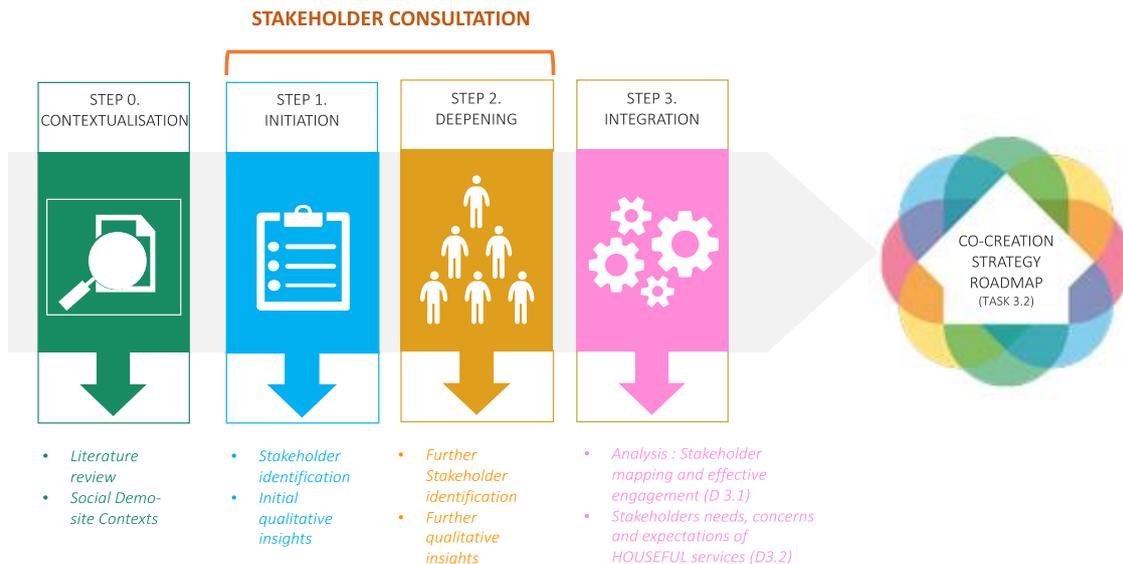


Figure 1 Methodology to achieve the Roadmap for the co-creation strategies

The general structure for the consultations that need to be done in order to address the stakeholder analysis is based on a three-step procedure with a previous process of literature review.

- **STEP 0. LITERATURE REVIEW AND CONTEXTUALISATION.** To identify the analytical variables and dimensions of the analysis and to set up a consultation framework for step 1 to 3, as well as to create a social profile for each of the demo-sites.
- **STEP 1 INITIATION-** This step is related to undertaking a short questionnaire to a selection of key stakeholders (aware of the existence of the project Houseful, and/or involved in related initiatives in the sector).
- **STEP 2 – DEEPENING.** During this step we deepened in the social analysis through further aspects, based on in-depth interviews and focus groups. Finally, results will be integrated into step 3.
- **STEP 3 – INTEGRATION OF RESULTS.** This was done based on two approaches:
 - **STEP 3.1.** (quantitative method) Stakeholder mapping through Social Network Analysis.

- STEP 3.2. (qualitative method) Analysis of the stakeholders' needs, concerns and expectations of HOUSEFUL services in order to gather insights of stakeholder's behavioural decisions for building circularity.

2.1. Step 0 Literature review and contextualisation

This first approach was to identify and set the social context at each of the frontrunner buildings as well as in general for the circular approaches in the building sector. A review of existing literature at each of the demo-site as well as a profound literature review regarding factors conditioning the stakeholder's attitudes and behaviour was done to frame the methodological initial approach and to build the consultation framework.

A first identification of stakeholders was conducted in the kick-off project meeting held in Barcelona in June 2018, in a group-building discussion process in order to generate a first stakeholder database.

This first analysis was used as a basis and a point of discussion in order to establish the next steps regarding the process of contacting the stakeholders and how to go about it.

In parallel, a literature review of the social context of each demo-site was done as well as an in-depth literature review of ca. 200 scientific articles. Annex 1 summarises the literature review process.

The result of this process was the creation of a consultation framework, as a document that served as a guide for the WP3 team to work together in consulting stakeholders. The following step 1 and step 2 summarised main elements of this consultation framework.

Results coming out from this step are discussed in section 3 of this document.

2.2. Step 1 Initiation (questionnaire)

The main objective of this step was to analyse and identify stakeholders (policy makers, public authorities, designers/architects, researchers/universities and CSOs) and the key connection points between them, in order to identify key experts in the housing sector and circular economy, the main interested actors and also the influential agents over the course of the project. The specific objectives of this step were:

- To create a real and current perspective of the interest and concerns of those actors to be potentially involved in the co-creation activities within the Houseful project.
- To start the stakeholder network map for those that are to be engaged in the co-development of the Houseful solutions.
- To start analysing how to strengthen the participation among the stakeholders and to establish a process enabling social networking amongst them.
- To foster dialogue in order to establish space for interaction to take place and to promote critical reflection on the project activities.



In order to address the objectives described above, we have formulated the following research questions. We will attempt to answer these research questions through various activities including launching a questionnaire to the stakeholders that are mainly aware of the Houseful project. The following questions are used as a guide in the formulation of the objectives and will help the project to have an idea of the possible expected results:

- How does the HOUSEFUL “aware community” perceive the project?
- Who are the key stakeholders?
- Who is in contact with whom?
- What is their level of interest/influence over the project activities?
- What are their general perceptions of the benefits/risks of the proposed solutions?
- How can we achieve effective engagement with the selected stakeholders?

2.2.1. Methodology of the Step 1-INITIATION

The questionnaire (not representative at statistical level due to the fact that it is addressed only to the key stakeholders) was based on closed questions mainly, so that the gathered results are more reliable and minimizes the bias, but we also introduced some open questions to let the respondents develop their own point of view.

Since there are two different locations in which we launched the questionnaire at the case study level of the two buildings in Catalonia (Spain) and the two buildings in Vienna (Austria). The language used was in Spanish, English and German, thus giving everyone the opportunity to understand the questions and be able to answer them with clarity and understanding.

The questionnaires addressed the following themes: circular economy, understanding of the project, particularities of the housing sector, the general perception towards the reuse of resources, and the effective engagement for the co-creation activities.

The questionnaire was preceded by prior contact via email or telephone with each of the stakeholders (see examples in section 7.1.5). The WP3 partners were required to review the stakeholder database to identify who they should contact. The type of stakeholders selected for the questionnaire were normally those that can be aware of the project, or those that have already gained some knowledge in the housing sector and the circular economy models that can be applied within this sector.

The questionnaire itself consisted of three parts:

- An introduction to the questionnaire in order to explain the objectives of the consultation, as well as informing about the ethical aspects according to the WP8 ethical procedures,
- The questions divided into 4 sections (Circular Economy; Housing Sector; About Houseful; General Questions). The questionnaire is included in Annex 1.
- A text of gratitude and a formal request to be included in the stakeholder database according to the WP8's ethical procedures.



The questions were chosen in order to address the research questions. Therefore, the majority of the questions were related to the following group of variables (as referenced from the literature, section 2.2).

- **Organisational:** To identify the level of knowledge and experience of our interlocutor regarding the circular economy. We will analyse the possibility of coordination and collaboration of the different stakeholders (associations, qualified professional management) who would be willing to participate in the project. As well as their ability to influence the consequences of the Houseful project.
- **Behavioural aspects related to experience.** We will try to find out which business models / or other experiences with regards to circular economy exists. It will help us to know the relevant ecological behaviour and the approaches that we must adopt in order to promote behavioural change. It will also help us to know the attitudes towards circular solutions.
- **Personal attitudes.** We will try to find key people capable of positively influencing the success of the project, analysing their environmental awareness, their sensitivity to the project, and the consequent commitment or motivation that they show. It is important to know the attitude they have regarding reuse. We will also try to find out the insights to what could be potential barriers or problems to implement the CEBOs.
- **Cultural conditions:** To assess the barriers and opportunities that we can find at the social level (issues of trust in institutions, social rejection, lack of knowledge of the potential benefits, a lack of training of the prescribers of the project, social aspects, etc.).
- **Engagement:** We will look for the key factors for the recruitment process in the election and cooperation with the stakeholders that support the circular economy. We will also try to identify relevant, interested or influential actors that we should try to engage with.

2.2.2. Limitations

Regarding the nature of the method used to gather responses from the key stakeholders identified at this stage, i.e. the questionnaires, have raised certain constraints. These constraints are listed below:

- A lack of completed questionnaires
- A lack of support to the respondent if any questions were not fully understood.
- Difficulty in controlling and verifying the responses

Regarding the respondent's attitudes, some constraints and risks have also identified, these are as follows:

- *Sincerity:* while there are many positive aspects related to the use of questionnaires, a lack of sincerity can be a problem. The respondents may not be 100% honest in their answers. This can happen for several reasons, including the social desirability bias and the desire to protect privacy. To avoid the lack of sincerity, respondents have been informed that the process does not require personal identification.
- *Conscientious answers:* Every administrator expects to obtain conscientious answers, but there is no way of knowing if the respondent has thought about



the question before answering. Sometimes the answers are chosen before reading the whole question or the possible answers. Sometimes respondents move from one question to another quickly, or make decisions in a fraction of a second, affecting the validity of the data.

- *Understanding and interpretation*: The problem of not asking questions face-to-face is that they can be interpreted differently. Without someone to explain the questionnaire and make sure that each individual understands the same, the results can be subjective. Respondents may also find it difficult to understand the meaning of some questions that are clear to the creator. Thus, this lack of communication can lead to biased results.
- *Feelings and emotions*: A questionnaire cannot fully capture the emotional responses or feelings of the respondents. Without administering the questionnaire face-to-face, there is no way to observe facial expressions, reactions or body language. Without these subtleties, important information may go unnoticed. It is for this reason it is so important to undertake step 2 (Deepening) of this consultation framework.
- Respondents own motivation: as with any type of research, bias can be a problem. The participants of the questionnaire may be interested in your product, idea or service. Others may be participating because of the questionnaire theme. These trends can lead to inaccuracies in the data, generated by an imbalance in the respondents who think disproportionately positively or negatively on the subject.

2.3. Step 2 Deepening (interviews)

The purpose of this step was to deepen the social analysis of the results gathered from step 1, based on the qualitative social research methods (interviews and focus groups). The main objective after this step was to analyse the specific factors influencing behavioural choice making structures of people and the potential social risks and the barriers affecting successful demonstration of the proposed Houseful solutions as new services. Results provided us with guidance for an effective engagement strategy at each building.

The specific objectives of this step were as follows:

- Build the in-depth analysis based on the results from Step 1.
- Identify the specific factors influencing behaviour and social attitudes towards the use and implementation of Houseful solutions, as well as the contextual and cultural conditions and belief that can also influence decisions.
- Start engaging with stakeholders and find the motivational trends for them to be involved within the co-creation actions.
- Facilitate the recruitment of participants for the co-creation workshops.

The following research questions were addressed during these consultations:

- How are decisions taken with regards to the implementation of circularity models at each of the demo-sites?
- What are the knowledge needs required to be ready to participate in Houseful social engagement activities?



- What are the main environmental considerations and priorities perceived by the different stakeholders' groups and how this may affect the housing sector and the implementation of circularity solutions?
- What risks or benefits are perceived through the implementation of CEBOs in the demo sites?
- What are the motivations of stakeholders to create a change in behaviour towards circularity models in the housing sector?

2.3.1. Methodology for the deepening (interviews)

A bottom-up approach was proposed in order to gain an insight directly from those dealing with the issues of the housing sector and to allow participants of these consultations to express their opinions and thoughts in an open manner. Therefore, the empirical approach we used, was based on interviews.

The selection of participants was indicated in the Stakeholder database Column "M". This was based according to the results from the previous step, based in the interest shown through the response of the questionnaire and willingness to further engaged of the respondents. Also, other participants were identified according to the snowballing process of the stakeholder's network analysis from the questionnaire. The snowball methodology consists on contacting initial stakeholders and from there on ask these stakeholders for additional stakeholders of interest for the topic addressed. The snowball process usually finishes once suggested stakeholders start to repeat or information retrieved from these stakeholders becomes repetitive.

2.3.2. Limitations

The majority of the limitations from the questionnaire procedure were solved with this in-depth consultation based on face-to-face interactions. However, some limitations are still expected.

Regarding logistical issues:

- *A lack of availability of participants or a need to speed-up the process due to another appointment.*
- *External issues that can hamper the process of a face-to-face interaction: inadequate room, noise, etc.*

Regarding the facilitators attitude, some constraints and risks are identified:

- *Positioning and facilitator's own motivation: every facilitator tried to not interfere in the respondent's opinion, but due to the consciousness and commitment to the Houseful project, some answers or conversations could have been biased by the enthusiasm or interest shown by the facilitator.*

Regarding participant's attitudes, some constraints and risks can be identified:

- *Respondents' own motivation: as with any type of research, bias could have been a problem. The participants may have been interested in the project. Others could have participated because they would like to interact and exchange ideas with the participants or facilitator to look for future opportunities (networking). These trends can lead to inaccuracies in the data,*



generated by an imbalance in the respondents who think excessively positively or negatively on the subject.

- *Sincerity*: while there are many positive aspects with face-to-face interactions, a lack of sincerity can still be a problem. The respondents may not be 100% honest in their answers. This can happen for several reasons, including the social desirability bias and the desire to protect privacy or confidentiality issues from the organisations they represent. To avoid the lack of sincerity, respondents have been informed that the process does not allow for personal identification.

Regarding the transcription of interviews, some constraints, and risks can be identified:

- *Interview transcription literality*: after the development of interviews each partner of the Houseful project transcribed interviews. According to the established protocol transcriptions should be translated into English and be literal. However, some transcriptions have captured main ideas and not the whole dialogue. This to certain point can influence the descriptive analysis of interviews as subjective viewpoints can be lost during the process.

2.4. Step 3 – Integration of results.

Results have been integrated and analysed based in two different approaches, in order to identify and analyse the social structure we used the Social Network Analysis, and a qualitative analysis by using MAXQDA to further identify factors shaping the Stakeholders' needs, concerns and expectations of HOUSEFUL services as well as to identify stakeholder's behavioural decisions for building circularity.

2.4.1. Step 3.1. (quantitative) Stakeholder MAPPING through Social Network Analysis

Overall, the stakeholder identification and mapping process followed the Social Network Analysis (SNA) technique, which is based on the analysis of the structure of a social network. SNA is used to analyse structural characteristics of social relationships and provides measures to analyse communication networks within and between organisations. It helps to identify information pathways, spreaders (knowledge brokers) and gatekeepers (knowledge controllers); and supports the process of knowledge sharing within and between organisations²

SNA views social relationships in terms of the network theory³ consisting of nodes and ties (also called edges, links, or connections)⁴. In the Houseful context the nodes are the organisations/institutions that have shown interest or influence in

2 Kar-Hai Chu, Heather Wipfli, Thomas W. Valente, (2013) Using Visualizations to Explore Network Dynamics, Journal of Social Structure, Volume 14.

3 Network analysis is the study of social relations among a set of actors. It is a field of study -- a set of phenomena or data which we seek to understand. In the process of working in this field, network researchers have developed a set of distinctive theoretical perspectives as well.

4 Wasserman, S. and K. Faust, 1994. Social Network Analysis. Cambridge: Cambridge University Press.



the circular economy and/or housing sector, and the ties are the relationships between them in this context.

The way in which SNA has been approached for this project task is based on a snowball network study⁵ where Houseful partners were first consulted in the kick-off meeting to indicate key stakeholders according to their knowledge. The results from this first consultation allowed, in turn, for a further consultation to stakeholders beyond the project consortium (step 1 and 2).

Specific questions were addressed in the consultation process with regards to the social network structure of each of the demo-site. Therefore, as a result a database of stakeholders and CE initiatives in the housing sector was created with detailed information about the contacted organisations. The database of stakeholders has been internally stored in the WE&B (WP3 leader) storage system according to the WP8 Ethics and cannot be open shared. However, in order to visualise the maps of stakeholders, we have used the web-based software Kumu⁶, to create relationships maps from each of the sites as well as the general context (not related to the demo-sites), based on the answers from the questionnaire and in the interviews.

Results coming out from this step are discussed in sections 4.1 and 4.2 of this document.

2.4.2. Step 3.2. (qualitative) Insights of stakeholder's behavioural decisions for building circularity

A qualitative analysis has been conducted in order to identify social beliefs, concerns, and perceived risks and benefits of the proposed solutions. This analysis also allowed the creation of a strategy for the development of solutions based in a co-creation approach. All interviews have been translated to English and transcribed. The transcriptions have been codified with the MaxQDA analytical qualitative software according to the variables described in section 2.1. Through the codification of the interviews based on the variables described in section 2.1. emerging topics could be identified, and their relevance assessed. The deductive analysis has been done commonly to all variables, however in this deliverable 3.1 we only addressed the issues of effective engagement, co-creation and co-management in order to elaborate the Co-Creation Roadmap (section 5). The other variables are addressed in the Deliverable 3.2.

Resulting from this analysis, we collected the co-creation ideas for the workshops from a deductive process. In addition, ideas for co-creation were also identified through an internal brainstorming process based on a questionnaire to Houseful consortium members.

Results coming out from this step are discussed in section 4.3 of this document.

⁵ A snowball network refers to the idea that the elements identified in an egocentric survey then become egos themselves and are able in turn to nominate additional elements.

⁶ <https://kumu.io>



3. General Context on Social values and beliefs of the circularity in building

3.1. The Analytical Scope of the Consultation Framework

Based on an extensive literature review, principally from the social sciences of more than 200 research articles, we could identify the analytical variables and dimensions conditioning behaviour and attitudes in circularity models of the housing sector. Based on the analysis of these research papers, the figure below summarises the conceptual framework that we have based on three theoretical axes. The first axis relates to the relevant categories for social analysis as uncovered in the literature. The second axis is related to the environmental parameters of the circular economy in the Houseful project, and the third axis to the management status of the housing sector.

Analytical Framework of Houseful stakeholder’s belief and behavioural structures (WP3)

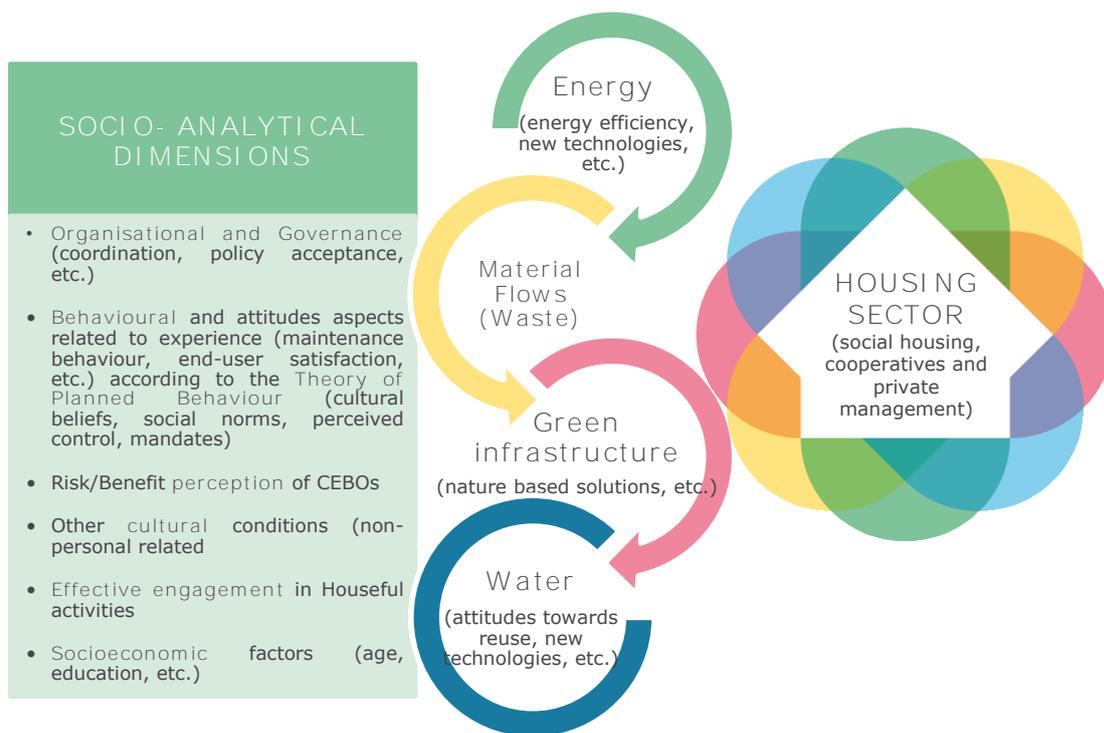


Figure 2. Conceptual framework for social analysis in WP3.

This conceptual framework has been designed for the entire scope of the WP3. However, deepening into the social sciences analysis will be further elaborated in *Deliverable 3.2. Social perceptions and beliefs in circular economy at building scale (version I)*. In this deliverable the conceptual framework is further addressed in order to it defines the process by which the analytical variables are defined. Consequently, the table below elaborates the three conceptual axes that make up the variables according to which the consultation process has been designed. It is not the aim of

the report to further detail the reasoning behind each variable, this will be detailed in the conceptual framework. We have included here though, in order to categorise the type of questions in the consultations.

Table 1 List of analytical variables (for the whole WP3 approach)

Dimension and Variables	Description
Organisational Dimension	Organisational – related to aspects about how different management systems, and/or governance of Housing and Circular Economy can condition the engagement procedures
Organisational/political	Political system and participation in decision making. To look at organisational level and see levels of coordination between different departments, divisions, in public organisations or not
Organisational/Capacity to adapt	Capacity to adapt to circular economy models. To explore how the stakeholders, have resources to adapt to circular models (it is not about willingness or attitudes but resources)
Organisational/Knowledge	Knowledge about CE - At institutional level, to know about the relevance in acquiring new knowledge about circular economy
Organisational/Future	Future development - Future development of circular economy in the region. Issues about engaging with other organisations, initiatives, etc.
Behavioural Dimension	Behavioural aspects related to experience and daily life of the stakeholders. Based on the Theory of Planned Behaviour attitudes towards reuse, subjective norm towards using reuse schemes and perceived behavioural control over knowledge and the perception of presence or absence of capacity, resources and opportunities to adopt reuse schemes (this category is intrinsically related to the previous one but not only related to daily behaviour. What are the perceived attitudes towards new technologies in CE and refurbishment
Behavioural/Ecologic	Ecologically relevant behaviour (and towards circular economy). What is being done (in reality)
Behavioural/Change	Behaviour Change - Approaches to encourage a change in the behaviour (as required for new reuse systems). Motivation or attitudes that can encourage the behavioural change
Behavioural/Power influence	Behaviour Influence - Leadership, decision-making, and power-sharing, stakeholder power and role in the process.
Behavioural/Performance	Behavioural performance towards recycling, and specifically towards selective recycling
Behavioural/Satisfaction	End-user satisfaction (comfort parameters (such as winter thermal comfort, summer thermal comfort, indoor air quality and acoustics),



Personal attitudes/Nature	Nature experience and learning about nature. The notion of staying in close contact with nature could increase the acceptance of solutions, e.g. Natural solutions, Nature Based Solutions
Personal attitudes/Awareness	Environmental consciousness, awareness raising - Personal perception of being environmentally friendly, or consciousness.
Personal attitudes/Motivation	Perception about reuse practices. Attitude towards reuse practices (water, waste)
Personal attitudes/Ownership	Ownership of solutions. For the potential users of CEBOs, Enhancement of the reputation for green building ownership.
Risk Perception	Risks perceived by the stakeholders over the proposed solutions
Perception/Trust	Perceived reliability or trust in the organisations that operate or manage the buildings
Perception/Environment	Perceived risks with regards to environmental/nature issues
Perception/Needs	Perceived needs for maintenance/usage or requirements for maintenance of the solutions proposed in the Houseful context.
Perception /Health	Concerns on human health issues
Benefit perception	Benefits perceived by the stakeholders over the proposed solutions (quality of life improvement, gentrification influence)
Perception/Trust	Perceived reliability or trust in the organisations that operate or manage the buildings
Perception/Expectations	Perceived expectations about the building. Aspirations, expectations created towards and specific issue (in this sense this could be circular economy, new housing systems, etc.)
Perception/Environment	Perceived benefits with regards to environmental/nature issues
Perception /Health	Concerns on human health issues
Cultural Dimension	Other cultural conditions and beliefs with regards to the societal context, particularities perceived due to cultural conditions in each site
Cultural/barriers	Barriers and constraints to all aspects except those personally related
Cultural/beliefs	Cultural beliefs. The way of life, cultural beliefs related to the context of the building



Cultural/Community	Cultural and community stability and cohesion, with regards to the building as a community
Cultural / Property	Personal and property rights. Issues with regards of renting, buying, a sense of ownership
Cultural / Market	Related to market appeal of green building projects
Cultural / Economy	Financial incentives or monetary gains provided by the government
Cultural/Awareness	Awareness of the existence of solutions in circular economy
Engagement Dimension	Effective Engagement, to explore the notion of “success” “and provide clarity on the authors’ conceptualisation of successful engagement and interaction of stakeholders in the context of Houseful
Engagement / SNA	Engagement and networking - Social Network Analysis: about the relationships with other institutions
Engagement /Co-creation	Attitudes towards co-creation /Participation. Capacities, Resources and funding. Barriers to co-management in the housing sector

3.1.1. What can be considered effective engagement for the co-creation process?

In this section, we provide an overview to explore the notion of “success” “and provide clarity on the authors’ conceptualisation for successful engagement and co-creation with stakeholders in the context of Houseful. The adoption of circular solutions in the housing sector requires strengthened coordination and stakeholder’s involvement in the process of creating the CEBOs. Therefore, effective engagement in this context of circular economy is explored as well as how can lead to coordinated co-creation actions.

Stakeholder engagement commonly refers to the relationship and interaction between institutions and those who are impacted by the activities of that institution (Sloan 2009)⁷.

Attempts to identify factors for successful engagement include the work conducted by Measham et al. (2009)⁸. They detail a range of factors that contribute towards successful engagement from various perspectives, such as governmental and community-focussed activities; these include developing trust, effective communication, being inclusive and being transparent, among others.

Engagement is similar to participation in regard to its broad meaning, describing the various ways in which information, views or opinions flow multi-directionally between

⁷ Sloan, P. (2009). "Redefining Stakeholder Engagement: From Control to Collaboration." Journal of Corporate Citizenship 26: 25 - 40.

⁸ Measham, T. G., C. Robinson, C. Richards, S. Larson, M. S. Smith and T. Smith (2009). 'Tools for successful NRM in the Lake Eyre Basin: achieving effective engagement'. People, communities and economies of the Lake Eyre Basin. L. B. T.G. Measham. Alice Springs, Desert Knowledge Cooperative Research Centre. DKCRC Research Report 45: 125 – 170.



the public and decision-makers (Cass, 2006)⁹. We agree with Sloan (2009) in that it is important not to conceptualise stakeholder engagement too simplistically, but rather “distinguish between different forms of stakeholder engagement”.

Cotton stresses that debates about the impacts of technological development and implementation cannot continue to follow the traditional format of expert-led technocracy, or as Cotton writes, “a purely objective and factual discussion, bounded by the rationality of techno- scientific analysis” (ibid: 161)¹⁰

The term "co-creation" can be understood as engaging citizens, users, academia, social partners, public authorities, businesses (including SMEs), creative sectors and social entrepreneurs in processes that span from identifying problems to delivering solutions. For the purpose of the co-creation of CEBOs, engagement should lead to the following impacts: demand-driven innovation, gaining understanding of common needs and approaches, fostering the ownership of results that would lead to acceptance of the solutions.

3.1.2. The variety of ways of interaction

The ways in which knowledge exchange takes place is, sometimes based on behavioural motives, needing meaningful stakeholder engagement. Positive perceptions are associated with the involvement of communities (Devine-Wright, 2005; Loring, 2007)¹¹. Wolsink (2007)¹² asserts that local support may turn to opposition if the concerns of local stakeholders are not considered and incorporated into decision-making process. Moreover Berkes (2009)¹³ also raised the importance of a bottom up approach as the best way to incorporate traditional and indigenous means of managing resources, as already introduced in Section 2.1.

In Houseful, we seek to promote meaningful and effective engagement, observing that it demonstrates several benefits: enhances inclusive decision-making, promotes equity, enhances local decision-making, and builds social capital. This approach requires a combination of modes of communication and flexibility in its implementation. Therefore, the resulting co-creation roadmap should be understood

⁹ Cass, N. (2006). Participatory-Deliberative Engagement: a literature review.

¹⁰ Cotton, M. (2014). Ethics and Technology Assessment: A Participatory Approach, Springer-Verlag Berlin Heidelberg.

¹¹ Devine-Wright, P., (2005). Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy* 8 (2), 125–139.

Loring, Joyce McLaren. "Wind energy planning in England, Wales and Denmark: Factors influencing project success." *Energy policy* 35.4 (2007): 2648-2660.

¹² Wolsink, M. (2007). Planning of renewables schemes: Deliberative and fair decision-making on landscapes issues instead of reproachful accusations of non-cooperation. *Energy Policy*, 35(5), 2692–2704.

¹³ Berkes F, Folke C (eds) (1998) Linking social and ecological systems. Management practices and social mechanisms for building resilience. Cambridge University Press, Cambridge



as a framework where co-creation should take place but adjustments in its implementation will be expected to accommodate stakeholder needs and demands.

In the context of the Houseful project, we consider stakeholder engagement as referring to the activities of, and the interactions between stakeholders involved with the aim of co-creating the CEBOs. Therefore, we explored the factors that make actors show interest, influence and interact on water and climate related issues leading to the effective engagement. In the context of this report we investigate what are stakeholders' willingness and interest to engage in the co-creation process.

The co-creation roadmap resulting from the analysis and integration of results is further described in section 5 of this document.

For stakeholder engagement to be effective in the long-term and allow stakeholders to reflect upon experiences and expectation of the engagement process. Several facilitators do exist I) The importance of education and awareness-raising activities; II) The establishment of a Committee for engagement and management of activities to strengthen linkages between stakeholders; and III) Specific events which represent moments for successful collaboration and exchange of knowledge and information (Graham et al 2012)¹⁴. Besides awareness, of course motivation and commitment are central aspects to make a sustained and continued impact. For this continued impact to happen, knowledge sharing and provisioning, the establishment of baselines, monitoring, assessment, and reporting as well as, implementing and improving an engagement management system are important aspects (Jiang et al. 2013)¹⁵.

3.2. The social contexts of each of the demo-sites

This section will be updated upon the final approval of the demo-sites

¹⁴ Graham, M., and H. Ernstson. 2012. Comanagement at the fringes: examining stakeholder perspectives at Macassar Dunes, Cape Town, South Africa—at the intersection of high biodiversity, urban poverty, and inequality. *Ecology and Society* **17**(3): 34. <http://dx.doi.org/10.5751/ES-04887-170334>

¹⁵ Jiang, P., Chen, Y., Xu, B., Dong, W., & Kennedy, E. (2013). Building low carbon communities in China: The role of individual's behaviour change and engagement. *Energy Policy*, 60, 611–620. <https://doi.org/10.1016/j.enpol.2013.05.017>





HOUSEFUL

3.2.1. Overview demo-sites

The following section of the document provides an overview of the 4 case studies of the project from the social, political and knowledge context of the circular economy.

SOCIAL CONTEXT HIGHLIGHTS				
	Demo 1	Demo 2	Demo 3	Demo 4
Regional information		▪ Catalonia	TBD	▪ Vienna



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 776708

Demographics	- Sabadell (209.931 inh.)	- Sant Quirze del Vallés (19.939 inh.)		Case study 4: 21st district (158,700 inh.)
Governance context	- Sabadell is the co-capital and second largest city of the County of Valles Occidental in Catalonia, Spain	- TBD	TBD	
Housing Management type	Social Housing (rental)	Social Housing (rental)	Cooperative	Social Housing (property)
Key Aspects	<ul style="list-style-type: none"> - High rate of social problems (exclusion, low income, criminality, etc.) - Families and high number of children - High fluctuation - High rate of migration 	TBD	TBD	<ul style="list-style-type: none"> - Medium/low income families - Families with high number of children - Medium migration rate - Low fluctuation
Previous CE studies	Observatori CE Catalonia, Vallés Circular, 4RinEU, PlugHarvest (H2020 projects)		<ul style="list-style-type: none"> - Katche (H2020) - Plattform Kreislaufwirtschaft Österreich. - Circular Futures 	
Previous knowledge regarding Houseful	- Low awareness in the region	TBD	TBD	- Low awareness in the region



3.2.2. Social Context: Case studies 1 and 2 (Sant Quirze del Vallés and Sabadell)

The case studies 1 and 2 are located in Catalonia (Spain), in the towns of Sabadell and Sant Quirze del Vallés. They are located in the Vallés Occidental territory in which 917,905 inhabitants live in an territory of 583,13km² and a population density of 1,574.1 inh/km² (Idescat, 2018). It is a relatively small territory, since it makes up 12% of the Catalan population. In 2017, 1738 housing projects were started in the Vallés Occidental, of which 68 were for social hosing, therefore it can be noted that there is a fairly large inequality in this area between private housing and social housing.

With regards to circular economy, in Catalonia an observatory called "Circular Catalonia"¹⁶ has been created, which carries out circular economy initiatives. This observatory is promoted by the Catalan government. Catalonia also has the so called "Valles Circular"¹⁷, which is an agreement signed by several regional entities from Catalonia to incorporate principles of circular economy in the economic, social and environmental development policies that promote public-private cooperation in the Vallés Occidental territory.

The problem of access to housing has become one of the main social problems in the territory, representing one of the most important demands of low-income social structures. After the boom in the building sector that lasted up until 2012, and because of the financial crisis, nowadays families have to make a big effort to be able to afford mortgages. As a consequence of that, the demand in the construction sector has slowed down and there has been a decline in construction activity.

The recent electoral programs, from the Catalan elections in 2017, identify certain social priorities, that the political parties look to perform as a basis of major concerns of Catalan citizens. Within these, concerns related to housing follows a very frequent theme, the concern for decent housing, integrating low income social class to access social housing and a need for a greater sustainable energy efficiency, this is reflected in the table 2 below.

Table 1 Social concerns regarding housing reflected in the electoral programs of the Catalan parties in 2017.

- Need of more social housing
- Dignified housing – To remove energy poverty

¹⁶

http://mediambient.gencat.cat/es/05_ambits_dactuacio/empresa_i_produccio_sostenible/economia_verda/Catalonia_circular/

¹⁷ <http://vallescircular.com>



- The existence of empty dwellings and a lack of access to it
- Refugee social inclusion
- Social renting housing
- New housing tools implementation such as cooperatives.

According to the data from 2018 from the Catalan Housing Agency (AHC), the total number of existing homes that are designated for social housing in the municipalities of Sant Quirze del Vallès are 213 houses, and in Sabadell 4463 houses.

Demographics in demo-site 1: Sabadell

Sabadell is currently a municipality composed of 211.734 inhabitants, with an area of 37,79km2 and a population density of 5602,9 inh/km2. In Sabadell, 48.6% of the population are men and 51,38% are women (Idescat, 2018) and the age distribution of Sabadell is as follows:

Age class	Sabadell	Vallés Occidental Territory
0-14	16,17%	17,23%
15-64	65,19%	66,37%
65-84	15,55%	13,92%
85 and more	3.05%	2,46%

Table 2. Sabadell Demographics (Demo 1)

The economic sector that has more weight in Sabadell is the services sector (84,47%). In the latest data collected by Idescat in 2011, 37,1% of the population was employed, while 14,1% were unemployed. The municipality has experienced a constant population growth since 2000, currently this growth is stabilizing.

The Houseful project (demosite 1) will be carried out near the public primary-school Joan Sallares i Pla, in a building called "The teacher's block", located at Calle Campoamor 98, which currently has a social use. The district of Campoamor is located in District 6 of Sabadell, south of the city.

Demographics in demo-site 2: Sant Quirze del Vallés

TBD

3.2.3. Social Context: Case studies 2 and 3

Vienna is a federal state, federal capital and the largest municipality in Austria. In the federal state 1.897.491 people life organized in 23 city sections (districts). Its



municipal districts are not administrative districts as defined by the constitution; Vienna is a statutory city and as such is a single administrative district in its entirety.

Out of its 8.7 million inhabitants, Austria has a workforce of 4.4 million people who are generally highly educated and skilled. The services sector dominates the economy, and also employs more than two thirds of the active population. Tourism has a strong impact on the country's economy.

The image below depicts the gross value added (GVA) of Vienna in 2016, where the values that are added to the goods and services in the different stages of the production process are collected.



Figure 3. Gross value added 2016. Source: Vienna City Administration

Unemployment rate in Vienna was in 2017 at 10,4% and its population has been growing since 2004. Vienna is both a state and a municipality with a state senate and a federal council. Vienna as a state is led by the party SPÖ. Among other things, the district heads and the selected district representatives are responsible for compulsory schooling, local aesthetics, road construction, etc. Competences and household are assigned by the city. The district chief is formally subordinated to the mayor.

In general, Austria is a pioneer of the circular economy, being a strong partner of the EU. Austrian households generate approx. 4,3 million tons of waste per year, of which 90% is recycled. The initiatives implemented by the Austrian Waste Consulting Association (VABÖ) have paid off. For decades VABÖ has worked together with municipal environment and waste consultants to raise awareness of the need for consumption that saves resources. However, the circular economy is not an issue that is only relevant in the field of waste management but must also be addressed at the level of society. One key initiative was launched in March 2018 called Circular Futures¹⁸, it was held by the Austrian Circular Economy Platform. Representatives from the EU, Austria and other EU Member States (Netherlands, Finland, Scotland, Slovenia) discussed opportunities and challenges for the transition to a circular economy in Austria. It promotes networking activities and informs about current political initiatives and developments.

¹⁸ <https://www.circularfutures.at>

Demographics demo-site 3 – TBD

Demographics demo-site 4 – Floridsdorf

The building is located in the 21st district of Vienna called “Floridsdorf”. The district has a total population of 165.673 inhabitants (Statistik Austria, 2019) of which 48,44% are men and 51,55% are women. The age distribution of Floridsdorf is as follows:

Age class	Floridsdorf	Vienna
0-19	21,20%	19,34%
20-59	56,65%	59,12%
60-74	14,16%	13,69%
75+	7,97%	7,82%

Table 3. Floridsdorf Demographics (Demo 1)

The district head is the first representative when it comes to improvement of local aesthetics and road construction. Housing and classification of the area is done by the mayor for whom municipal authority departments work – in Vienna the MA18 is the decisionmaker about city development and planning. For the frontrunner building itself, residents have a right to say something and NEUES LEBEN is in charge to ensure it. The Houseful Demo 4 will be implemented at Donaufelder Strasse 115, which is a residential building consisting of 54 apartments, one day care centre and one supervised flat-sharing community for young people. From a technical point of view, this building is comparable to approximately 70% of residential buildings in Austria.



4. Results

In the following section, the results are organized according to the dimension of analysis: the social structure (stakeholders' map and relationships) and the factors that condition effective engagement. Firstly, we present an analysis of the stakeholders and database, as well as how to identify the social structure based on the SNA analysis. On the other hand, at the level of engagement strategies, the results are analyzed on the factors that condition the effectiveness of these strategies, both in the process of generating circular solutions and in their long-term use (co-management). Finally, through a deductive process based on the generated evidences and an internal consultation process within the consortium, a list of co-creation ideas has been generated that will be used as an input into Task 3.2.

4.1. Who are the HOUSEFUL stakeholders?

The HOUSEFUL Stakeholders are defined as those organisations that can show interest and/or influence in the context of the circular economy in the building sector and the related solutions developed through the lifetime of the project, both at a general level and especially in the nearby communities of the project front runner buildings.

In this sense, a stakeholder database has been generated with organisations and initiatives with regards to circular economy and the housing sector. Individuals were not the target of this research; therefore, the contents of the database are only organisations and initiatives that have been identified.

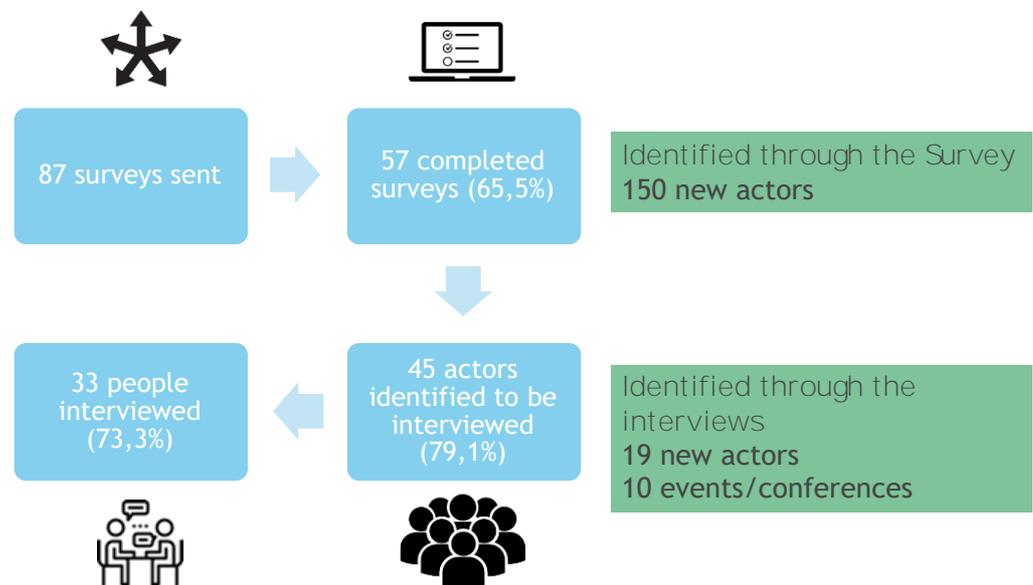


Figure 4. Results of the consultation process.

A total of ca. 270 organisations were identified through this process. The following figures display the results of the implementation of this consultation process:



- 87 new organisations were identified from the consortium. 57 organisations answered the survey. Giving a total of 65.6% completion rate.
- A total of 1240 connections were identified.
- A total of 45 actors were identified to be interviewed, 33 actors were finally interviewed, and 1 focus group was undertaken. In this process 19 new actors and 10 new initiatives were identified.
- 67% of respondents are male and 23% female. The age structure of respondents was the 66% between 30 and 49 years of age, 32% above 50 years of age and 2% between 18 and 29 years of age.
- Regarding their relation to demosites, 52% are related to the Spanish context, 34% are related to the Austrian context and 14% to the European context.

As explained in the methodology (section 2), during the kick-off meeting, the stakeholder identification process was started. This allowed for the identification of 34% of the total stakeholder database. Following this, the first consultation process (the questionnaire) was undertaken allowing for 60% of the stakeholders to be identified. Finally, 10% were identified during the interview process.

Stakeholders Identification - Snowbaling process

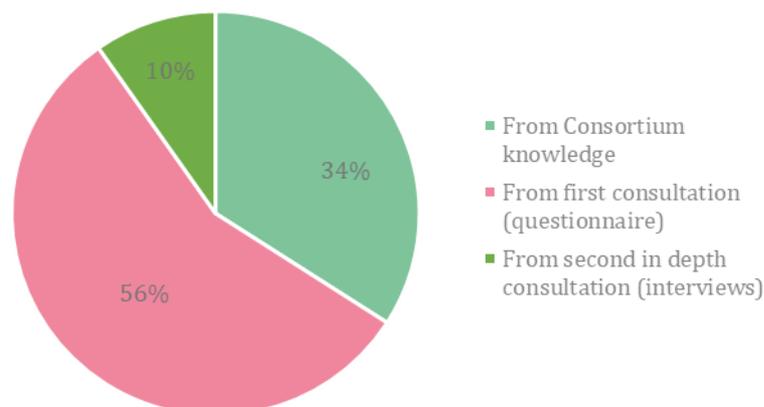


Figure 5 Percentage share of stakeholders identified in the snowballing process.

A first approach in the identification of stakeholders was developed during the project kick-off meeting (June 2018, Barcelona) which allowed for a quantitative overview of the potential of the consortium in reaching relevant organisations. Additionally, partners answered a questionnaire based on the quantity of networks they could reach and the main areas and regions of interest. This first analysis completed at this very initial stage of the project was used as a basis and point of discussion for the conceptualisation of Task3.1. The rapid analysis aided in providing a preliminary evaluation of the stakeholders in the demo-site areas and thus provided a first overall impression of the 'ecosystem' of action.



In the process of identifying stakeholders, we have addressed stakeholders considered to be experts in the beginning or with a high influence in the decision-making process. We started the snowballing process with the consortium (mainly composed by experts in the housing sector or Circular Economy). Naturally the key linkages identified with other stakeholders are similar organisations or those with high influence with whom they can interact. The majority of groups addressed are policy makers and public agencies, designers and suppliers. We have also addressed the research community and the general public through CSOs. The reason that individual inhabitants have not been adjudged to have quantitative relevance so far in this study is because during the consultation process, we have not targeted individuals to conform with confidentiality issues and ethics. Moreover, as we have addressed organisations, we were able to identify at least one inhabitant’s association per building.

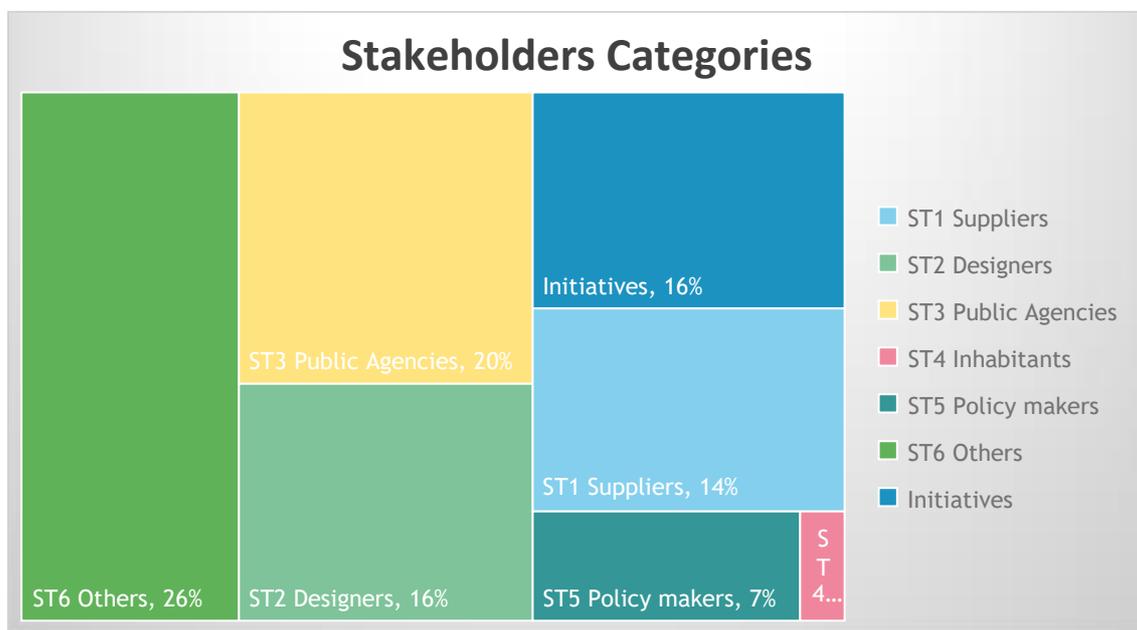


Figure 6. Share of stakeholder’s categories in the consultation process.

In general self-conception of the familiarity with the concept of circular economy between stakeholders is high. These stakeholders which to their own understanding are acknowledgeable on the circular economy approach conceive Houseful circular solutions as very applicable and the risks that they conceive are always lower than the benefits derived from them.

4.2. The social structure: How stakeholders are connected?

PLEASE NOTE: THIS SECTION IS PENDING THE CONTEXT OF DEMO 2 AND 3 ONCE APPROVED BY THE COMMISSION.

The stakeholder map below has been created using the KUMU software to explore the complex web and alignment of key players around the Houseful project. Within



this map, the main connections of the network can be seen overall, as well as specific information for each of the organisations.

Basic Tips to read the main Houseful Stakeholder map

- There are two essential figures: the nodes (stakeholders) and the edges (the connections).
- The colour key:
 - Orange nodes: stakeholders in the region of Catalonia
 - Blue nodes: stakeholders in the region of Vienna
 - Green nodes: stakeholders from a General Context (European)
- By clicking on each of the non-grey nodes further information on the specific stakeholder is displayed based on the main database.

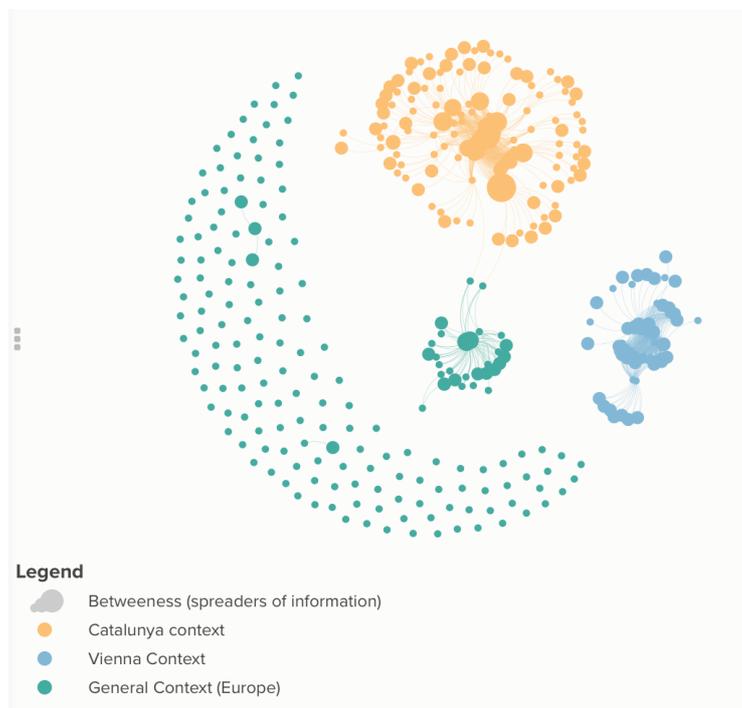


Figure 7. The Houseful social structure per contexts (Kumu Screenshot)

When looking at the social structure of the stakeholder database we can observe the three contexts (Catalonia, Vienna and General) as stated in the methodology (see figure below). We can observe that currently there are no major connections between these 3 groups, a result that we expect at this stage.

The figures below show the generated map of stakeholders in the Catalanian and Vienna contexts (still they will be enlarged once demo 2 and demo 3 are approved).



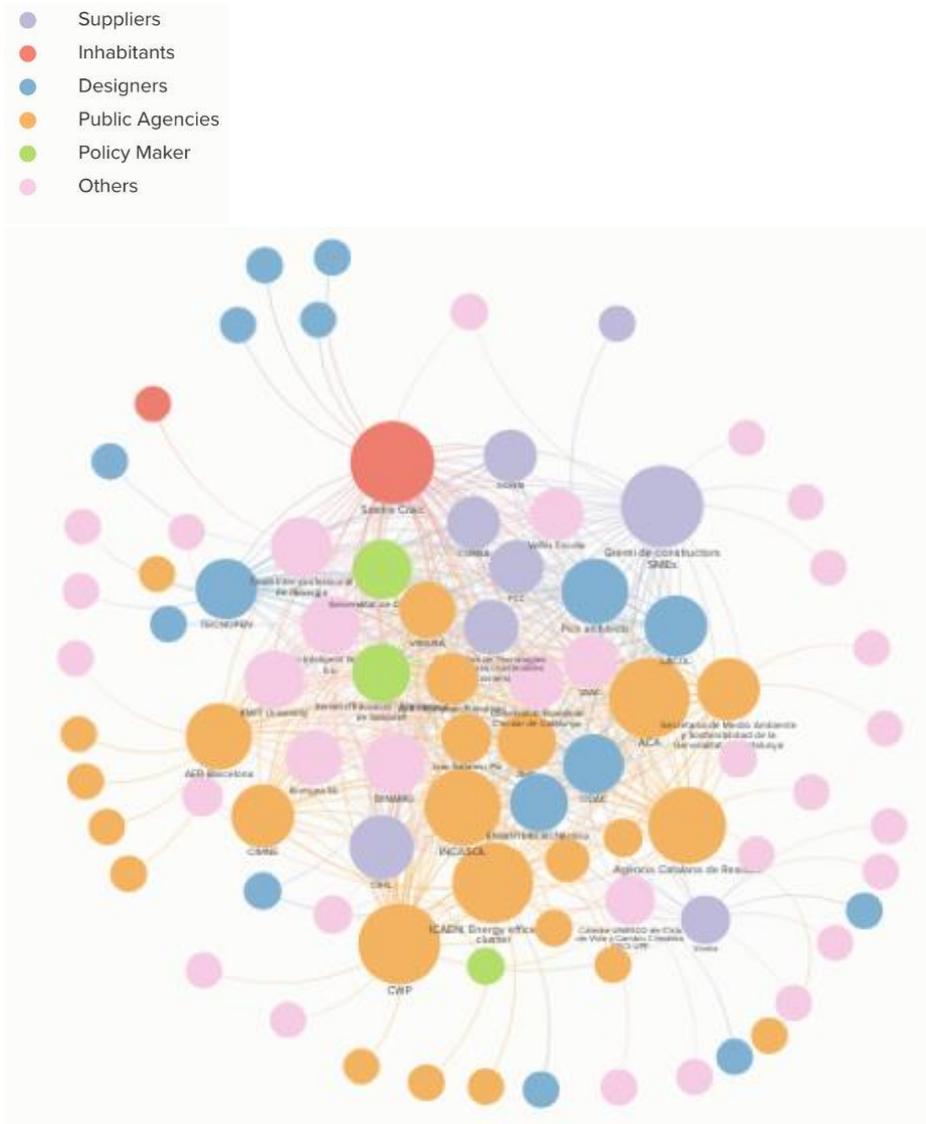


Figure 8. The Houseful social structure per stakeholder categories in Catalonia context (Kumu Screenshot)

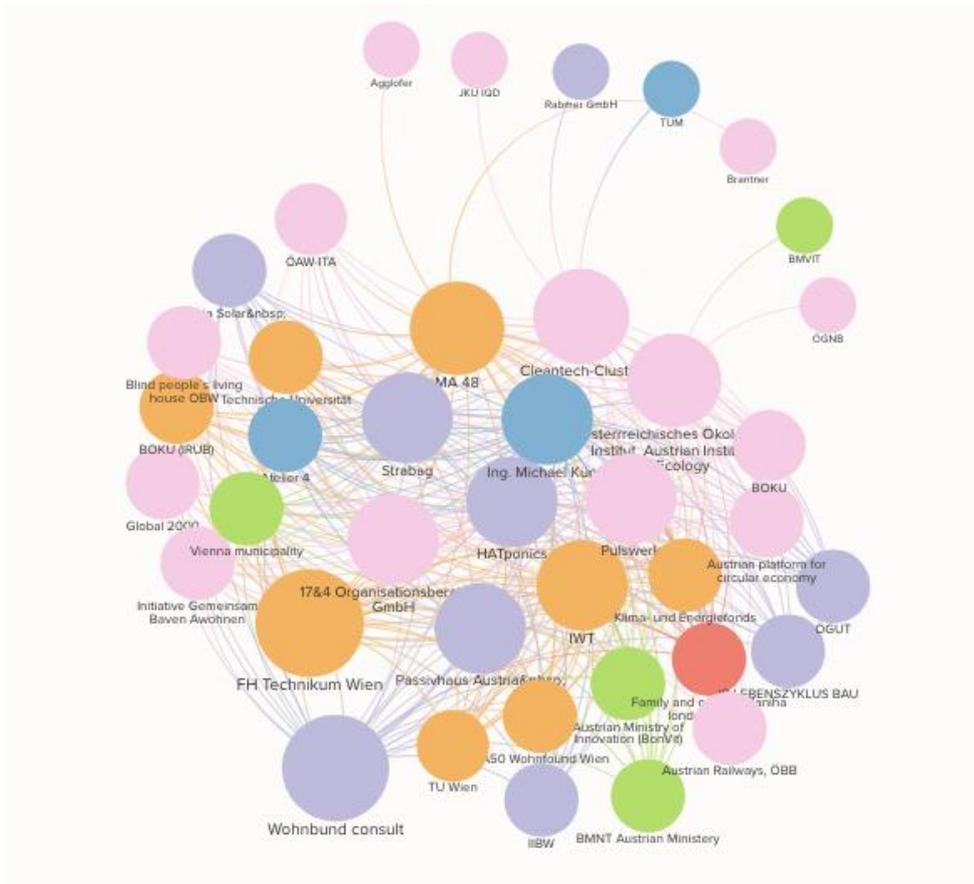


Figure 9. The Houseful social structure per stakeholder categories in Vienna context (Kumu Screenshot)

Connections for the general Context organisations are only showed a few of them, because the main aim was to define the local context at each demo site. However, the snowballing character raised the identification of many organisations at a general context (but we do not aim at also identifying all connections at general level).

The sub-sections below further explore the characteristics of the Houseful social network through analysing the specific SNA structural metrics from the *Kumu SNA calculator*. The SNA structural metrics are broken down into: 1) Betweenness Centrality, and 2) Indegree.

As already highlighted in Section 2 of this report, the values for each of the SNA metrics gathered are based on graph theory. The results are displayed in a table with a ranking of the values gathered for each of the metrics.

4.2.1. Betweenness Centrality

The Betweenness Centrality metric measures how many times an organisation lies on the shortest path between two other organisations. In a general context, the organisations with high Betweenness (indicated by a high score) have more control



over the flow of information and act as key bridges within the network, on the contrary they could also be potential single points of failure. In this initial mapping process, the organisations that have greater control on information flow are Government of Catalonia, Catalan water Partnership (CWP), Ellen Mac Arthur Foundation and Veolia.

Rank	Label	Value of betweenness
#1	Departament de Territori i Sostenibilitat - Generalita de Catalunya	0.045
#2	CWP	0.038
#3	Ellen Mac Arthur Foundation	0.027
#4	Veolia	0.026

Table 4 SNA metric – Betweenness

4.2.2. Indegree

The Indegree metric measures the number of incoming connections for an organisation (i.e. the number of organisations that mentioned them as a relevant stakeholder). The organisations with a high Indegree (indicated by a high score) can be considered stakeholder leaders where others see them as a source of advice, expertise, or information. The stakeholders identified as the greatest influencers are: Catalan water agency (ACA), Sostre Cívic (a social housing initiative in Catalonia), Energieinstitut Vorarlberg (energy research), and the Gremi de Constructors d’Obres de Barcelona i Comarques (housing workers association in Barcelona).

Rank	Organisation	Value of Indegree
#1	Agència Catalana de l’Aigua (ACA)	60
#2	Sostre Cívic	59
#3	Energieinstitut Vorarlberg	58
#4	Gremi de Constructors d’Obres de Barcelona i Comarques	58

Table 5 SNA metric – Indegree – Who are the influencers?

4.2.3. Interest vs influence

The interest and influence of stakeholders can give an idea of their predisposal in engagement strategies and their potential relevance to it. The interest and influence of stakeholders can clearly be distinguished between groups. According with results, least interest and influence is assigned to researchers. Two groups of stakeholders with a high influence are public agencies and policy makers with the former less interested than public agencies. Inhabitants are also distinguished for having a very high interest and high influence. An intermediate level of interest and influence is given by suppliers, designers and the group of other stakeholders.



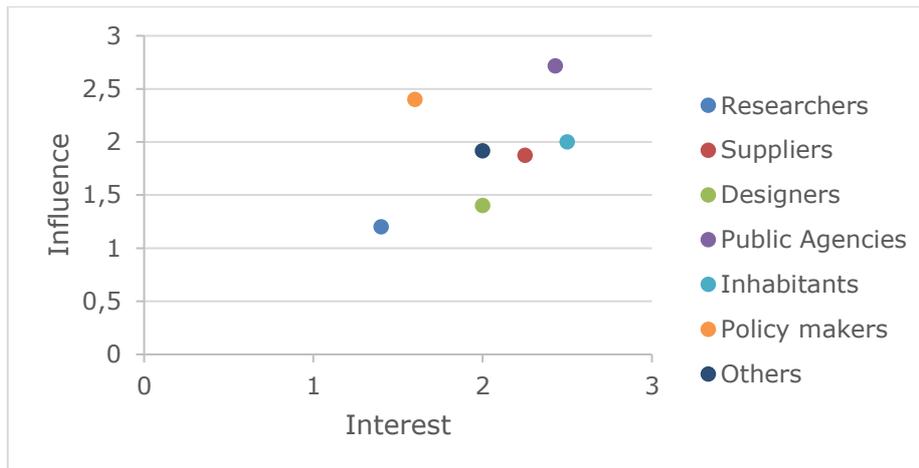


Figure 10. Interest and influence. The figure shows the interest and influence that stakeholder groups can have in the Houseful project with values from 1 to 3 being 3 high and 1 low.

During the stakeholder consultations, in the interview process, the potential role that the organisations consulted could have in the Houseful environment was explored. The table below shows the roles and their ability to influence the process that have been responded to by each of the stakeholder groups interviewed.

Table 6. Roles /Influence per target group

ST TYPE	Roles
ST1 Suppliers	<ul style="list-style-type: none"> Transfer the ideas to reality and to create solutions with low energy consumptions, efficient water cycle, etc. Take part in related associations: Solar- Heat-Europe association Consulting for building owners, private persons, building developers, decision-makers Take part in engagement actions. Support in the adoption of new legislation for CE solutions implementation
ST2 Designers	<ul style="list-style-type: none"> Facilitator for different actors having a holistic or general vision of the project Quality and efficiency counselling Be active in social housing Justification of the solutions proposed from a technical point of view Take part in cooperatives
ST3 Public Agencies	<ul style="list-style-type: none"> Change agent Integrate the different sector to work towards CE Promote EC policies
ST4 Inhabitants	<ul style="list-style-type: none"> Play a key role in the decision-making process and in the co-management process
ST5 Policy Makers	<ul style="list-style-type: none"> Responsibility of the decisions taken with regards of governance of circular systems Create an action plan for the adoption of circular solutions
ST6 Others (CSOs, clusters)	<ul style="list-style-type: none"> Cradle to cradle approach Implementation of co-created solutions Create awareness about the CEBOs



- | | |
|--|---|
| association,
research
community) | <ul style="list-style-type: none">• Education• Contribute in networking solutions: clusters, create new projects, etc.• Multipliers of information: spreading the message |
|--|---|
-



4.3. How to effectively engage with stakeholders?

After having discussed what effective engagement should lead to, both in the questionnaires and interviews, we deepen into the concept in order to clearly identify what facilitates and what could hinder the process for the co-creation of the CEBOs, as well as generated lessons learned. The table below summarises the identified barriers and facilitators and includes some quotations (in italics) from the consultation process.

Table 7. Facilitators and Barriers for effective engagement.

Facilitators		
About the characteristics of the CEBOs	Comfort is addressed in the solution	(deductive evidence)
	Low maintenance	<i>Maintenance is a very important issue. This should be easy and cheap, if we add difficulty and it is more expensive than a conventional system (in a way that in the final balance we have no savings), it is not worth it.</i>
	Stepwise implementation	<i>The improvements it brings, I think I don't know, what I said, in each building or each community you can implement or for example you can implement solar panels or better recycling of water, I don't know. Not all at once [...]</i>
	Costs/Benefits are understood by users	<i>Such solutions are accepted, when it comes down to any added value for the individual people, be it lower costs for anything or longer useful lives or any other things, it would make such solutions in any case attractive</i>
	Understanding the need and/or the benefit of the solution	(deductive evidence)
	User's habits are known, and the co-creation process is built upon.	That this [CEBOs are] exactly thought for these people with their habits. I mean to know their habits to see how they can change, because otherwise they will not be able to persistent in time. The changes. In the end we all have our very rooted daily routines.
	Creating a feeling of need of CE solutions and of ownership of the project.	<i>I think, I do not know, but I suppose ... that it lasts depends a lot on people's involvement. In other words, if you have managed to get attached to the project and have a sense of belonging regarding these measures, these things will be sustainable over time. And how is this achieved? Well, involving people but also as the same people who manage the maintenance of these systems that are placed [...]</i>
About the engagement process	Balanced representation of stakeholders and new actors are engaged through the process	Then, I believe there should be a broad and balanced representation of the different actors of the sector involved in the constructive process up to the final user. It would be important to have all the actors of the sector represented equitably.
	Use of a common language	(deductive evidence)
	Community feeling to facilitate engagement	<i>"I think, I do not know, but I suppose ... that it lasts depends a lot on people's involvement. In other words, if you have managed to get attached to the project and have a sense of belonging regarding these measures, these things will be sustainable over time. And how is this achieved? Well, involving people but also as the same people who manage the maintenance of these systems that are placed [...]"</i>



	Users empowerment and involvement from the onset of the project	<i>"All these actors must be involved and participate in the process from the beginning because this type of solutions is not immediate, they need time and maturity to find the right solution"</i>
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Barriers for effective engagement		
About Housing sector (social housing and cooperatives)	Sustainability is not a priority for users' profile of social housing in general, therefore the needs or benefits of circular solutions cannot easily become a priority.	<i>There are neighbors who do not pay the energy bill, some do, they consume... yes there are many who come from not using anything in order to pay a small energy bill, to not have a high bill. With this kind of users, you do not reduce anything, it is more increasing the comfort of families. Here, at the level of refurbishment, it is about using materials that are more efficient, more sustainable</i>
	In social housing, user's rotation is quite often in some cases, this would undermine effective engagement (even though rotation is decreasing)	<i>There is also a whole part of work with the neighbours that we have to look at how we do it. There will be a lot of rotation of people that should be looked at how to manage it. We have to explain to them what they can throw where and how ... a job must be done and, as XXX has told you, their priorities are others.</i>
	Negative perception about secure investments of financing sector upon cooperatives	<i>Well, a cooperative can help. One that gets involved in a cooperative to buy a house, usually is a person more conscious for these subjects. Although, the cooperative aspect is not well seen in the market, unfortunately. [Here in Euskadi there is a cooperative experience, isn't it?] Yes, but when they are going to buy the houses, it is well seen that the seller isn't a cooperative. Because when it is through a cooperative it seems that is going to be cheaper for you at the beginning but then when there's a problem, you are the promotor, so people are getting scared with this subject.</i>
About circular economy and CEBOs	CE is perceived as an academic topic far from implementation and with uncertainties	<i>In Vienna I would say, that there is no reason, the need is missing. In theory it is known, that we have to react to climate change, but circular economy as a solution is not in the foreground. There is a lack of awareness. Circular economy is an academic topic, it is not discussed in mainstream media or discussions.</i>
	Lack of coordination between the project pace and bureaucratic activities	<i>I believe that the main barrier to many innovations of an environmental nature are basically legislative. We in all the issues of reuse always end up dealing with the issue of legislation, no one knows exactly to what extent what they are doing is reuse is applicable, has a problem, it will not have it, when we can apply this water when do we not?</i>
	Pace of the project in comparison to other factors that affects it	(deductive evidence)
	Difficulty in addressing the different local context/interests	(deductive evidence)
	Perception that the project does not arise from user's necessity (bottom-up) but is top-down.	<i>These projects do not arise from a necessity that a user detects and for which he asks for a solution, it arises from a consortium of entities. It is a top-down approach and when we are dealing with a top-down approach there is a lot of work to be done at the bottom, because the need isn't felt. When the user</i>



		<i>feels that doesn't have a need... that is an extra barrier when it comes to implement new solutions and it is harder to do it.</i>
About the engagement process	Lack of knowledge and awareness along the value chain of the solutions	<i>At the moment people do not know about their actual behavior, how resource consuming it is and they do not know about alternatives. That is why educational work is so important.</i>
	Lack of agreement between involved actors	(deductive evidence)
	Lack of trust between engaged actors (users and policy makers or public administration in the housing sector)	<i>Users can't take decisions because they don't know how to do it.</i>

What are the ways of engagement? was also a consulted aspect during the questionnaires and/or interviews aiming at identifying the desired modes where effective engagement can take place.

Generally, the need was stated by the stakeholders to combine modes of engagement. The section below summarises the cited methods and tools that have been provided during the consultations.

Table 8. The mentioned combination of engagement methods and tools



The mentioned combination of engagement methods and tools	
<i>Events</i>	<ul style="list-style-type: none"> • Symposiums (for general public or technical audience) • Open conferences to share experiences • Workshops (i.e. value chain, of joint possibilities) • Field visits (to successful cases) • Trainings of all actors along the value chain (i.e. users for maintenance) • Interviews
<i>Ways of engagement (co-management)</i>	<ul style="list-style-type: none"> • Working commissions (in the spirit of cooperatives) • Working table • Cooperatives as source for wider co-creation processes
<i>Tools</i>	<ul style="list-style-type: none"> • Simulations of what is implemented • Users guidebook • Brochures to promote innovative solutions or buildings (to create a sense of ownership). • Information campaigns from the city that are both B2B and B2C. • Participation in Circular hubs and support centres
<i>Others</i>	<ul style="list-style-type: none"> • Word- of -mouth • Exchange platforms (adapted to each country to facilitate engagement of SMEs). • Information campaigns • Education (experts conceive the need to educate non-experts (specially users but also promoters or others) but education and training is in fact demanded).

The lessons learned are described below as derived from the table above and reflections from the consultation, also some quotations are provided from the consultations:

- The **role of cooperatives** in the housing sector has been discussed because it is one of the co-management tools most used that can have an important impact for wider implementation of the HOUSEFUL solutions. In this context, the interviewed cooperatives have had greater difficulty to get funding for their initiatives requiring a lot of effort from their side. Cooperatives have established CE approaches in buildings and for that the community feeling, empowerment and engagement from the onset of all actors was crucial (beginning with interviews, simulations of used methods). Actors participate from design to the end of the project. The drawbacks are seen as limited financing to cooperatives creating budget constraints.
- Interviewees have also expressed concern with regards to the **social housing** (especially in the context of demo 1 and 2, Catalonia), where users seem to



have conflictive profiles leading to the misuse of housing infrastructure has led to great distrust towards the dwellers. This has created a situation of a lack of trust from the administration in terms of maintenance as well as the use of technologies.

- The participants have mentioned the need for clearly explaining the benefit of implementing circular solutions. In this regard, proactive behaviour and engagement can be increased if the usage of the solutions generates **positive local economic impacts** for dwellers.
- A consortium like Houseful can also create a trust environment with engaged stakeholders, therefore a *strong collaboration of consortium partners* is desired to implement solutions. This should be coupled with the involvement of the whole spectrum of stakeholders (from designers to installers) to make solutions effective through a co-creation process.
- Context-wise we can also observe some differences. In Vienna, interviewed actors state that more technical approaches and social engagement is not perceived as a major issue. In contrary to that, in the Catalonia context, where both demo-site are from social housing. Social aspects are seen much more sceptical and difficult (specially for public administration).
- Thinking in terms of **long-term management**, the literature review in section 3 evidenced issues of **co-management** of circular solutions as well as the community stability in Housing. In this sense, several tools and methods have been discussed and mentioned during the consultation process:
- Creating a governance mechanism implying regular meetings with users (such as working commissions) with objectives build upon Houseful outcomes.
 - Engaging from the beginning to allow time to consolidate the right solutions and seeking a commitment from involved parties
 - Have experts on engagement involved with a budget to ensure continuity. Facilitation experts should be involved to seek cooperation with them to ensure long term effectiveness of circular solutions
 - Seeking funding opportunities to guarantee continuity: this can be



through public agencies, private funding, etc. (ie IBÖ in Austria)

When looking at particularities evidenced from the stakeholder’s categories, the figures below evidenced from the consultation process some of the previous aspects related to effective engagement

The interviewed policy makers were not interested or committed to be involved in the project co-creation workshops or F2F meetings. However, they would like to be involved through online actions (see Figure 6,7,8).

In general, the other stakeholder categories would like to be involved in a timely manner (not periodically) as evidenced in Figure 7.

Figure 6 and 7 shows that the consulted CSOs and similar organisations (third sector) expressed high interest in participating in F2F actions and the co-creation workshops.

Generally, most of the participants would still remain available for further bilateral meetings with them (focus groups, interviews, etc.), see Figure 9.

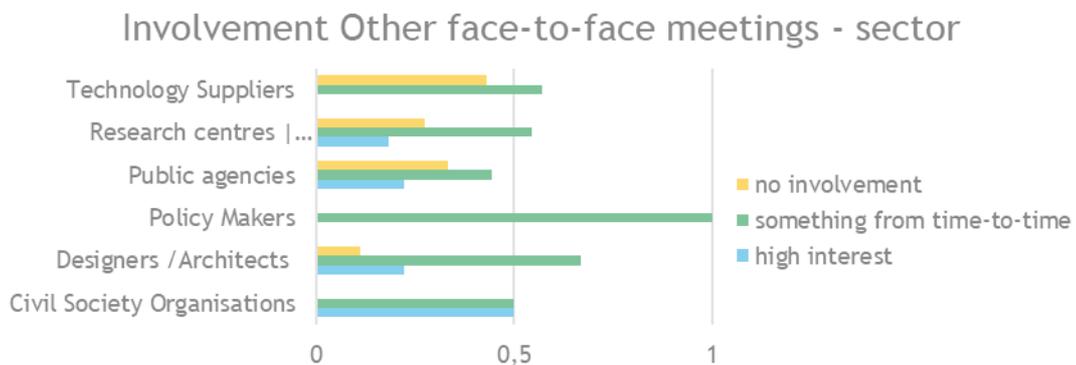


Figure 11. Desired involvement level of consulted stakeholders in other F2F meetings (not workshops).

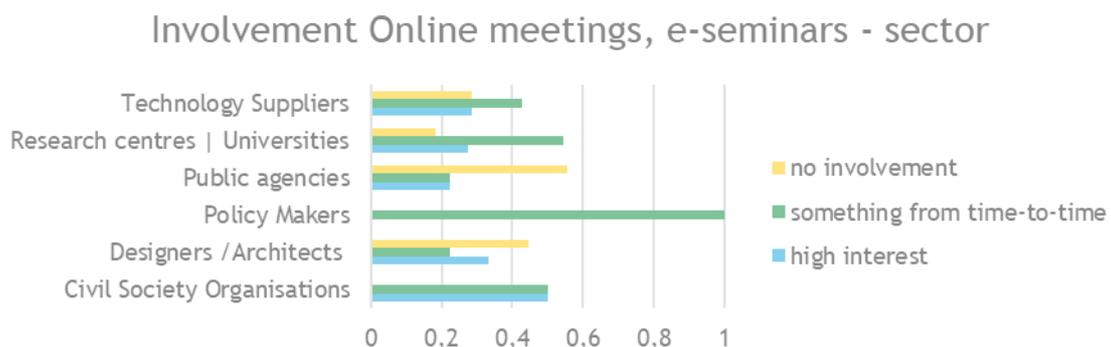


Figure 12. Desired involvement level of consulted stakeholders in online engagement tools.



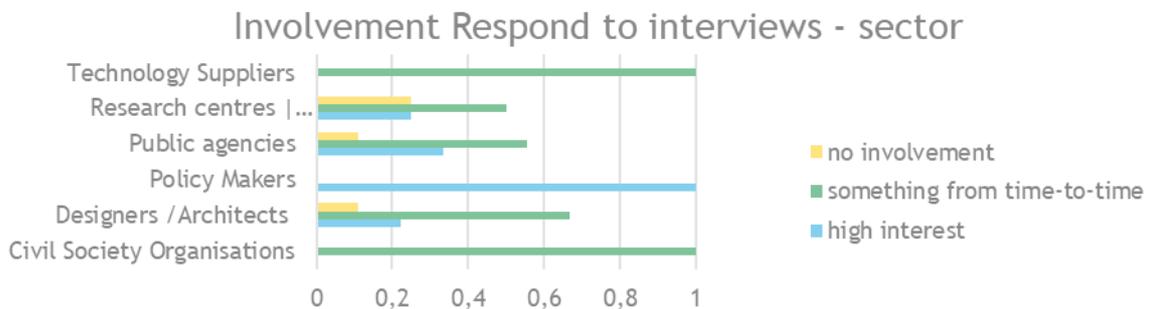


Figure 13. Desired involvement level of consulted stakeholders in being interviews or other types of bilateral meetings.

This predisposal to participate in project activities is surprising if it is considered that 75% of interviewed stakeholders conceive the circular economy approach and its application in the housing sector as the most interesting aspect of the project and only 23% the participatory character.

4.4. The generated ideas for co-creation

One of the Houseful challenges is about overcoming cultural and social barriers through an effective co-creation and acceptance of new CEBOs designed for the circular management and use of water, waste, energy and material resources. Therefore, a new circular thinking approach is required to enable better decision-making on the selection of circular solutions at different levels for all different stages of a building's lifecycle. This idea pursues promoting the participation and interaction of stakeholders in each stage for an optimal building's functionality and use of resources (water, waste, material and energy) in a co-creation process.

The project Task 3.2 aims at implementing the co-creation workshops. This task is conceptualised based in the results included in this deliverable.

After having consulted the stakeholders, the first list of ideas for this co-creation process resulted from the deductive process of the evidence gathered. Certainly, not the entire process can be co-created due to the timing process of the project in the different demo-sites and the current situation at local level.

The objective of this questionnaire was double: I) To identify main contact points for each solution; and II) To make an initial prospection on which solutions are desirable to be implemented in each site and what can be co-created together with stakeholders (and which stakeholders).

The provided list below, organises those ideas by the following criteria: 1) per each social context and demo-site; 2) per each of the 11 solutions (see Annex XX for the



list of solutions with a description as described in the project Gran Agreement); 3) per each of the value-chain steps (see figure XX below) ideas generation, design, usage phase, optimization, and a transversal). Also, each idea is accompanied with a description and the evidence found in the consultation process after having done the qualitative analysis with MaxQdA.

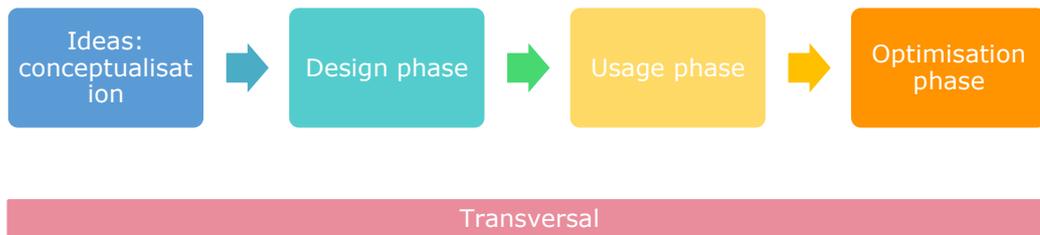


Figure 14 Phases for the generation of ideas

Nr.	Ideas for Co-creation process	Short description of the idea	Evidence from the consultation	Related CEBOs	DEMOSITE
IDEAS: CONCEPTUALISATION					
1	Items for a guide for stakeholder engagement in circular solutions for the housing sector	What do stakeholders need to be effectively engaged? What language needs to be used? What are the minimums to be included?	<ul style="list-style-type: none"> - Early engagement is seen as crucial for the success of the circular solutions 	S2	D1-D4
2	Identification of key users' lifestyles affecting CEBOs implementation	How to identify users' habitats with the aim at connecting them with the design of the solutions.	<ul style="list-style-type: none"> - User's habits are known, and the co-creation process is built upon. 	S0 to S11	D1-D4
3	Uses of the harvested rainwater	Rainwater can have multiple uses, but which need do local stakeholders have (i.e. watering of garden, toilets, etc.)? By addressing local needs acceptance and use of rainwater collection system can be enhanced.	<ul style="list-style-type: none"> - Rainwater collection is within the mindset of actors as an CE solution. - Water saving is considered important in context of climate change in Austria. For Spain it is a challenge at the housing level. 	S5	D1, D2
DESIGN PHASE					
4	Co- selection of the materials database	Sharing of knowledge and experiences in construction and dissembling knowledge between experts. Identify materials with a circular approach for the housing sector together with expert stakeholders.	<ul style="list-style-type: none"> - Consortium partners conceive that relevant stakeholders can contribute substantially to generate the materials database. - Relevant stakeholders can share expert knowledge on how to construct and dissemble building from a CE perspective and sources and sinks of the production process can be identified and shared. 	S3 and S4	D1-D3



5	Ideas for low cost CEBOS	Based on the CEBOs, which low-cost CE technologies could be designed? Which needs can low-cost CE technologies cover?	<ul style="list-style-type: none"> - Low cost CE technologies that are simple to use can represent a future line of development, and for Houseful? Can we co-design low-cost user-friendly CE solutions based on designed CEBOs? 	S0, S5, S6, S7, S8, S10 and S11	D1-D4
6	Basics for the aesthetics of solutions	How solutions should look like? What is important in terms of aesthetics?	<ul style="list-style-type: none"> - Aesthetics matters for the acceptance of solutions in the housing sector 	S3-S8	D1-D3
USAGE PHASE					
7	Training protocol	Identification of training contents for the usage and maintenance phase of selected CEBOs. I.e. creation of usage protocol for the community of residents of a Kitchen Waste Digester	<ul style="list-style-type: none"> - Along the value chain of CE solutions, from architects to maintenance managers, i.e. (for users/neighbours to do maintenance of CE solutions or be informed on use, to schools, surrounding neighbourhood) - Distrust in low social and financial capital dwellers can be counteracted with adequate training. 	S3-S11	D1-D4
8	Designing the usage phase and maintenance roles	Designing the governance of CEBOs to ensure adequate usage and maintenance of solutions. For that roles and responsibilities are identified to create accountable and just governance mechanisms through a multi-layered, participatory and deliberative process.	<ul style="list-style-type: none"> - Acceptance of solutions is strongly related to the acceptance in the usage phase. - The long-term thinking, for which adequate governance is central. - Trust in managers of solutions and buildings is seen as a critical point for long term applicability of CEBOs. 	S5-S11	D1-D4
9	Compost use and disposal (sharing services)	Compost waste from production to disposal identify with stakeholders: who is engaged? For what is compost used? Which synergies can be generated between actors?	<ul style="list-style-type: none"> - Local use of compost including supply chain can be an opportunity for the neighbourhood to collaborate with Houseful DEMOs. - Biowaste disposal and use ca have multiple nature and can be designed with stakeholders. 	S8	D3



- OPTIMITIZATION PHASE					
10	CEBOs benefits/outcomes visualisation through and App.	What monitoring indicators can be shown to stakeholders to evidence benefits generated by CEBOs? What design is needed to depict effectively CEBO benefits? Which benefits are of interest for different stakeholders (i.e. economic, environmental, social indicators)?	<ul style="list-style-type: none"> - If CE benefits are intangible it is difficult to engage stakeholders (specially tenants) and convince of their benefits. - By designing a communication tool for stakeholders of savings and outputs, acceptance of these CEBOs can be increased (different user interfaces could target different stakeholders: technical, administration, users...) an idea could be an APP. 	S0, S2	D1-D4
11	Management strategy to ensure technical energy efficiency	What needs to be accounted for to ensure long-term energy efficiency at affordable costs? Here requirements, opportunities and constrains for long term energy efficiency measures are identified and taken into consideration for CEBOs design and implementation.	<ul style="list-style-type: none"> - A technical approach is suggested. For example, how to make successful energy efficiency solution in residential housing? and how to ensure its long-term maintenance and functioning once Houseful finishes? 	S10	D1-D3
TRANSVERSAL					
12	Items for the online exchange platform	Stakeholders can contribute to design contents of an online exchange platform being it forums, user guides or informative contents.	<ul style="list-style-type: none"> - It can facilitate knowledge exchange between experts and between non-experts. - The platform should be adapted to each country (language and context). - Through knowledge exchange and generation distrust between sectors and actors can be reduced. 	S0 and S1	D1-D4



13	Key messages to include in an awareness campaign for the sludge management.	What messages need to be given to increase understanding of decentralized sludge management systems?	<ul style="list-style-type: none"> - Co-creating local sludge management with experts. - Awareness rising of tenants and municipality training to address acceptance of sludge management systems. - Adapt solution to local needs. 	S6	D3
14	Prototyping the future (e.g. Social SWOT on business model)	Which are the risks, benefits, opportunities and weakness that stakeholders along the value chain conceive of CEBOs prototypes? How can prototypes be improved to cover user needs?	<ul style="list-style-type: none"> - If users' habits and needs are incorporated in the entire value chain of the solutions, acceptance is more likely to occur. - It is also required awareness raising claiming from common activities. Therefore, based on Houseful solutions prototypes, SWOT could be recollected along actors of the value chain to include this feedback into the solutions development. 	S11	D1-D4
15	Sharing services	Some of these CEBOs could lead to specific sharing services: Which sharing service can be easily implemented? What is the need covered? Where can the sharing service within the DEMO site be implemented? How can the sharing service be managed?	<ul style="list-style-type: none"> - Servitization is one of the key CE approaches. However, experiences are controversial, but stakeholders consulted perceived them as a window of opportunity for Houseful. Examples is the sharing of washing machines. 	S0-S11	D3 and D4
16	Key messages for future communication about each demo-site	Identifying together at each demo-site the contents for future communication about what is being done.	<ul style="list-style-type: none"> - The need of showing and creating awareness about what is being implemented from CE in housing sector 	Not related to specific solution	D1-D4



17	Identifying and understandable terminology	User friendly language to transmit CEBOs functioning including user friendly software design and stakeholder perspective in CE evaluation to increase acceptance.	<ul style="list-style-type: none"> - Stakeholder perspective in CE evaluation can increase quality of the solution through expert knowledge. - Easiness of solution format and language can increase its communicative capacity and acceptance ("user friendly software design") 	S0 and S1	D1-D4
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The prioritization and assessment of the feasibility of these ideas to be implemented in the workshops of Task 3.2 will also be done in a collaborative manner. In this way, this prioritization will first be done internally with the consortium. This prioritization and internal assessment will be done through a Delphi process with an online questionnaire to Houseful partners and then through deliberation in the 18-month consortium meeting.

The results obtained will be finally validated in the first workshop of task 3.2.

All this process described above is included in Task 3.2.





HOUSEFUL



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5. The Co-Creation Roadmap

After analysing the results of the consultations carried out, the objective of this task is to design how the processes of engagement with stakeholders carried out through a co-creation process. Therefore, this section describes the roadmap that Task 3.2 should take around the workshops that will be done in each of the demo-sites. For now, it is a joint strategy for all the case studies.



5.1. Backcasting

The engagement activities will follow a backcasting process with the selected stakeholders, due to the problem-solving character of this methodology. Backcasting is a process of taking the imagined futures that are desirable and working backwards (in this case from right to left across a broad sheet of paper) starting with the ideal future and then moving backwards towards the present. This planning approach is increasingly used in futures studies in fields related to urban sustainability as an alternative to traditional planning approaches and a formal element of future strategic initiatives (Bibri 2018)¹⁹. By using the backcasting methodology the objective is to implement 3 types of co-creation workshops to start the engagement process in each one of the demo-site where the Front-runner are situated.

Within this process we aim at creating favourable future scenarios for the development of the CEBOs. In this sense, backcasting is fundamentally normative as it is concerned with not only describing what the future looks like, but in providing an evaluation of how the future buildings should be (therefore a total of 12 local workshops will be implemented). Normative scenarios show how a solution to a particular problem should look, from the participants' own personal point of view (B.rjeson et al. 2006)²⁰. Bibri (2018) argues that the backcasting approach is well-suited for finding long term sustainability solutions due to its normative, goal-oriented, and problem-solving character. Backcasting allows visionary images of futures at different temporal scales, and this can stimulate an accelerated movement towards achieving such normative goals.

Backcasting workshops are intended to get the participants to evaluate the future and justify their reasons during ongoing facilitated deliberation. Altogether, the output of this activity will be the basis for the co-creation of social validated HOUSEFUL services and also further considerations towards behavioural changes after effective engagement that will take form in the CEBO nr.2. Therefore, alongside the workshops a common approach to identify these attitudes and behavioural factors will be in a participative background. Also, during the entire process the snowballing process for the stakeholder mapping will happen in a transversal way.



Figure 15- The three co-creation workshops calendar (*WS: Workshop)

¹⁹ Bibri, Simon Elias. 2018. Backcasting in futures studies: a synthesized scholarly and planning approach to strategic smart sustainable city development. *European Journal of Futures Research* 6 (1): 27. Accessed July 27. doi:10.1186/s40309-018-0142-z.

²⁰ B.rjeson, Lena, Mattias H.jer, Karl-Henrik Dreborg, Tomas Ekvall, and G.ran Finnveden. 2006. "Scenario types and techniques: towards a user's guide." *Futures* 38 (7):723-739.

5.2. The Co-creation Roadmap Strategy

The figure below shows how this roadmap is organized on the basis of this three co-creation workshops and the inter-workshop processes. Synergies with other WPs are also provided.

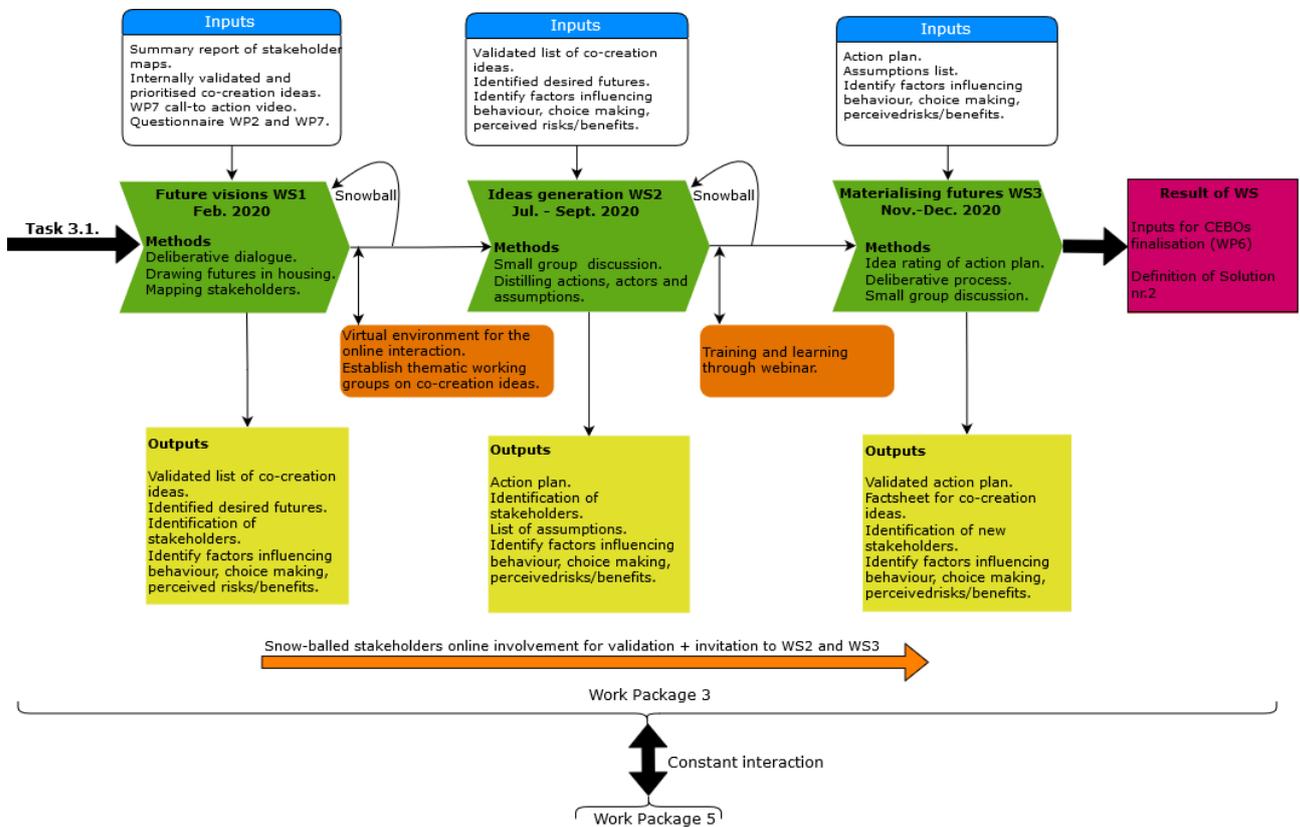


Figure 16. Co-creation Roadmap

The following sections described timely the roadmap:

Before Workshop 1 – Desired Future.

WS1 feeds from the results of the **consultation process** in Task 3.1 that aimed at identifying the perception and attitudes of the stakeholders with the solutions proposed by Houseful. Specifically, the list of ideas for the co-creation process provided in section 4.4. This list of ideas will follow a process of internal and external validation. Before WS1, the internal validation (within Houseful consortium) will be organised through a Delphi group process²¹ based in an online questionnaire first and followed by a prioritization based in a discussion process in the consortium meeting of the project in Month 18.

In this inter-workshop phase, we will generate the inputs for the discussion in the WS1:

- Summary report of stakeholder maps.
- List of co-creation ideas internally validated and prioritised.

²¹ The Delphi group process consists of iterative rounds of expert consultation to achieve consensus upon a specific topic in an anonymous manner.

- Dissemination information about Houseful and the CEBOs to be implemented in each demo-site.
- The call-to action video from WP7.
- A Feedback questionnaire including required inputs for WP2 (KPIs) and WP5 (impact indicators).

Some specificities per Demo-site **this will be updated with the inputs of the non-yet validated demo-sites:**

- In Demo 2 Sabadell, a pre co-creation workshop will take place with the key stakeholders that need bureaucratically to be approved which of the CEBOs will be finally allocated in the building. A participatory meeting will be designed in order to identify together with these stakeholders which solutions will be implemented. The key stakeholders will be: City council of Sabadell, AHC, LEITAT, IDP, WE&B, *Escola Pública Joan Sallarès i Pla* (School close to the building), and the inhabitant’s association.

Workshop 1 – Desired Future.

Workshop 1 – Desired Future for CE in Housing Sector
<p>Objective Design future visions on housing situation with emphasis in enablers and barriers which can be actions (to implement), actors or assumptions (context). Questions to be answered in this workshop: what is likely to happen? and what they want to happen with regard to the Housing sector? How CEBOs can help in achieve those futures? How they would like them to be produced?</p>
<p>Methods A combination of participatory methods will be used in this workshop:</p> <ul style="list-style-type: none"> - Deliberative dialogue with driven open questions. - Drawing futures for the housing sector: The ideal Circular House. - Mapping stakeholders in a short questionnaire through App (Kahoot) and evaluation.
<p>Expected Outputs</p> <ul style="list-style-type: none"> - Validated list of co-creation ideas to develop the CEBOs. - Identified desired futures at each of the frontrunner buildings. - Identification of new stakeholders and relationships (snowballing process). - Insights for the analysis of factors influencing behaviour and the choice making structure of people and perceived risks/benefits for the successful demonstration of CEBOs solutions.
<p>Synergies with other WPs WP5: social indicators for T.5.1.3 WP7: communicating about HOUSEFUL WP4: ideas for the CEBOs conceptualisation</p>



<p>Logistics</p> <ul style="list-style-type: none"> - Participants: Others, Policy makers, Public Agencies, Inhabitants - Timing: February 2020 - Duration: about 3h
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Table 9: Workshop 1 plan – Desired Futures

Between WS1 and WS2

The co-creation process will continue between the workshops. The objective in between the two WS is to keep stakeholders committed to the process and generate interest in participating in the next workshop. A combination of modes for engagement is desired according to the consultation process. Therefore, this in-between workshop interaction will be needed.

To this end, the Slack platform (or similar) will be used as a virtual environment for the online interaction through the Slack platform.

This online platform will be used for knowledge exchange. For instance, results from the WS1 will be exchanged with the participants. Also, we will establish thematic working groups around the ideas for the co-creation and those groups will be facilitated with further questions aiming at continuing the deliberative process and dialogue generation.

At the analytical level, the WS1 results will help to further generate evidence on the analysis of behavioural factors around circular solutions in the housing sector. Also, from the discussion generated we will identify other new organisations and their connections to keep mapping stakeholders.

At logistical level, we will continue contacting stakeholders identified during questionnaires and interviews of T3.1 to validate outputs of WS1 and invite selected ones to WS2.

Workshop 2 – Ideas Generation

This workshop will provide the basis to start building the designed futures in WS1 and co-create the CEBOs.

<p>Workshop 2 – Ideas generation</p>
<p>Objective</p> <p>To provide more ideas for the development of the CEBOs. The ideas should lead to a specific plan of actions and roles that will be based on assumptions about how to achieve the future scenarios. Design future visions on housing situation with emphasis in enablers and barriers which can be: actions (to implement), actors or assumptions (context). Questions to be answered in this workshop what is likely to happen, and what they want to happen. How CEBOs can help in achieve those futures? How they would like them to be produced?</p>
<p>Methods</p> <p>Small group-facilitated discussion using an approach to start action planning for implementing the backcasted visions of ideal housing and circular economy. The participants will be instructed to discuss in small groups</p>



<p>what actions the identified actors in the backcasting method should take to make specific ideal futures happen around the prioritized co-creation ideas. The proposed actions will be probably accompanied with assumptions to make them real. Actions and assumptions will be listed for each co-creation idea and rated one another's ideas using a specific format. The process will be finalised by distilling the actions, actors and assumptions into an action plan.</p>
<p>Expected Outputs</p> <ul style="list-style-type: none"> - Action plan for the development of the co-creation ideas. - Identification of new stakeholders and relationships (snowballing process). - Assumptions list to achieve the desired futures (needs and expectations from stakeholders for the housing sector). - Insights for the analysis of factors influencing behaviour and the choice making structure of people and perceived risks/benefits for the successful demonstration of CEBOs solutions.
<p>Synergies with other WPs</p> <p>WP5: social indicators for T.5.1.3 WP7: communicating about HOUSEFUL WP4: Ideas for the CEBOs conceptualization</p>
<p>Logistics</p> <p>Participants: Suppliers, Designers, Inhabitants Timing: September 2020 Duration: about 3h</p>

Table 10: Workshop 2 plan – Ideas generation

Between WS2 and WS3

During the consultation process it has been widely discussed the need of increasing knowledge and awareness of CEBOs solution. Based on the results from WS2 and the assumptions list, a series of webinar (WP7 framework) will be organised to respond to the need of knowledge generation to facilitate CEBOs co-creation and action plan implementation.

At the analytical level, the WS2 results will help to further generate evidence on the analysis of behavioural factors around circular solutions in the field of housing. Also, from the discussion generated we will identify other new organisations and their connections in order to keep mapping stakeholders.

At logistical level, we will continue contacting stakeholders identified during questionnaires and interviews of T3.1 to validate outputs of WS2 and invite selected ones to WS3.

Workshop 3 – Materialising futures

Workshop 3 – Materialising futures
Objective



<p>To provide feedback and validate the final ideas for the CEBOs and to support in the communication strategy for the co-created services to raise social awareness.</p>
<p>Methods Idea rating sheets for the validation of the action plans. Deliberative process to identify key messages around each co-created CEBOs to increase awareness of the service. Small group-facilitated discussion using an approach to start action planning.</p>
<p>Expected Outputs</p> <ul style="list-style-type: none"> - Validated plan to achieve the future scenarios for each building through the CEBOs implementation. - Factsheet for each co-creation idea with key messages for communication. - Identification of new stakeholders and relationships (snowballing process). - Insights for the analysis of factors influencing behaviour and the choice making structure of people and perceived risks/benefits for the successful demonstration of CEBOs solutions.
<p>Synergies with other WPs Questionnaire on the social indicators for T.5.1.3 has to be implemented. to present the SaaS created in WP6 that should include the inputs from this process.</p>
<p>Logistics Participants: all groups Timing: December 2020 Duration: about 3h</p>

Table 11: Workshop 3 plan – Materialising Futures

After WS3 – FEEDBACK

A layman report about the co-creation process will be produced and exchange with all participants of the workshop, this will include the long-term co-management process resulting from the WS3.

Specific co-created inputs for each CEBOs will be provided and exchanged with WP4.

After the entire co-creation process, an Open-House event will be organised to enable a wider community of citizens to see the building’s implementation and to show what has been co-created.

A final questionnaire will be created to assess the entire process and optimise the Solution 2 and will be send to all workshop’s participants (this will generate inputs for WP2 KPI indicators, and WP5 impact indicators).



6. Conclusions and Next Steps

The co-creation process has been designed on the basis of stakeholder consultations. On the one hand, we elaborated a first stakeholder map including the contexts of the already defined demo-sites (the next version will include demo 2 and demo 3). We have also explored which are the barriers, facilitators and best methods to generate an effective long-term engagement.

This has served as a basis for generating an exhaustive list of co-creation ideas across the entire value chain of the CEBOs. This process also resulted in the definition of a social engagement strategy that will assure proper co-creation actions during the project, establishing a clear roadmap for Tasks 3.2, as well as defining the basis for the demonstration of S2 solution.

The prioritization and assessment of the feasibility of these ideas to be implemented in the workshops of Task 3.2 will also be done in a collaborative manner. In this way, this prioritization will first be done internally with the consortium through deliberation in the 18-month consortium meeting.

The results obtained will be finally validated in the first workshop of task 3.2.



Annex. 1 Protocol for literature review

Inclusion and exclusion criteria of the literature review

To identify relevant literature, the following search terms were used:

To identify relevant literature, the following search terms were used:

- Public perception
- Public opinion
- Public concerns
- Public behavior
- Public attitudes

And/or

- Housing
- Circular economy
- Water reuse
- Waste, biowaste
- Energy recovery
- Nutrient recovery
- Nature based solutions
- New technologies acceptance

And/or

- Acceptance
- Support
- Willingness
- Engagement

And/or

- Perceived risks or
- Perceived benefits
- Barriers
- Obstacles
- Challenges
- Prejudices
- constraints

The electronic bibliographic databases that were used on the search were as follows: Academic Search Complete, , Psychology and Behavioral Sciences Collection, SCOPUS, Web of Science, Scopus, Open Science Directory and Google Scholar. We selected those papers that related to human participants and environmental issues and social science research areas. To identify additional articles of interest, there were searched the reference lists of screened articles, the citation lists of where the article was referenced and, also, in registered protocols related to the aim of this systematic review. We also searched the reference sections of known authors in the field in Google Scholar and Research Gate.

The search was restricted to articles published between 2000 to 2018, in English, and Spanish languages.

Those very technical studies on properties of the water and from fields of engineering and physics were excluded given in this moment we are focusing in public engagement and co-creation.

Selecting appropriate sources

Citations were downloaded into a Mendeley library. Their relevance was assessed against the predetermined inclusion and exclusion criteria by three researchers who independently screened all titles and abstracts. Forward and backward citation



tracking complemented the database searches. Full-text manuscripts were obtained for all studies entering the review. Any uncertainties about entering the review were resolved by consensus and, when necessary, by an examination of the full text.

Data extraction, analysis and synthesis

Two reviewers extracted data directly to an Excel spreadsheet. A framework was developed which provides a basis for organizing the literature according to comparable study contexts and allows synthesis of the results. We contrasted topic (water resources, water reuse, acceptance of decentralized technology, nutrient recovery, bio-solids, acceptance of new technologies, waste management), context, sample size, level of analysis, variables studied, data collection and data analysis. After the removal of duplicates, 591 potentially relevant articles were identified. 179 of these were excluded for being too technical or not directly related to the topic of study. At the full text review stage, 412 articles were reviewed.



Annex 2. Online consultation to stakeholders.

Introduction

This questionnaire is related to the Houseful Project (<http://houseful.eu>). Houseful has as its aim implementing circular economy solutions and services to the housing sector to foster a more sustainable economy in the European Union. A total of 11 circular economy solutions have been proposed and will be implemented in four different buildings located in Catalonia (Spain) and Vienna (Austria), to achieve a more efficient resource management along the life cycle of these buildings.

The idea is to co-create a neighborhood with services and resources that support the circular economy on the base of a more sustainable environment, while efforts are as well put in the development of methodologies that promote the commitment and social participation. In this way, the possible improvements and solutions offered by Houseful, with respect to the environmental parameters: water, materials, waste, and energy encourage a better comprehension of the needs and concerns between the diverse social actors.

To succeed with these objectives, it is necessary to generate an understanding of all the parts involved to obtain comprehension of how organizations, the politicians, citizens, and so on, within the European Union interact in the regions where Houseful will be implemented.

Help us to complete this questionnaire in the name of your organization.

The questionnaire will be open between the 7/02/2019 until the 22/03/2019 and will only take 15 min of your time.

The information which we get from the questionnaire is voluntary and will only be used for research purposes. In no case, this information will be used later to identify your individual answers.

If, in any way, you feel uncomfortable completing the questionnaire, you can refuse to answer any questions or finish the questionnaire sooner.

If you want to continue your collaboration, please accept the privacy policy.
Privacy Policy

Responsible: WE&B. Main goal: the realisation of this study reviewed in this document. Legal basis of treatment: express authorization of the participant, by signing this document (art. 6.1, letter 'a' of the GDPR). Criteria for conservation: your contact information will be saved only in the case that you have indicated your willingness to register the update of the results. The rest of the data, configured by the answers given to the responsible person, will be anonymized and stored indefinitely. Rights of the participant in the study: You have the right to agree in any moment, to access, rectify and remove your personal data, and right for limitation and opposition to the treatment.



You can also file a claim with the corresponding control authority if you consider that the treatment does not conform to the current regulation. Data transfer: In case that you have decided to register the results of the study, your data will be transferred to WE&B, who will manage the sending and management. Contact data to exercise your right: info@weandb.org.

1. I accept the privacy policy

- Yes
- No

Circular Economy

In this section we would like to analyse how the housing sector can move towards the approach of "circular economy" which is looking for a greater sustainable use of resources.

2. Does your organization know of, or is it related to, the circular economy approach?

- No relation/Never heard of it
- Not very much
- Somewhat
- A lot

3. In case your organisation is somewhat familiar with the circular economy approach (answers in the previous question: not very much, somewhat, a lot) could you please indicate the projects/initiatives in which your organisation participates in the circular economy?

(Open ended answer)

4. Although your organisation does not participate in the circular economy approach, do you know of any other project regarding the circular economy? If so, could you give us an example?

- Yes
- No Don't know
- Example of project/initiative (open ended answer)

5. According to your own opinion, please indicate the level of importance you consider that the following environmental aspects can more or less be easily applied within the housing sector (being 1, not applicable and 5, very applicable)

- Energy efficiency/energy saving
- Water reuse and efficient water management
- Recycling of household waste
- Building materials reuse
- New forms of co-management and participation
- Indicate here if you identify other topics that are not mentioned above (open ended answer)



6. Could you please name the organisations with whom you are collaborating that may be relevant for us to contact in the field of circular economy approach?

(Open ended answer)

The housing sector

Since three of the four buildings where the Houseful project is going to be implemented are social housing estates, while the other building is privately managed, we are therefore interested in analysing your perspective in this sector.

7. What type of housing is your organisation linked to?

- Option A: Social housing
- Option B: Private housing
- Option C: Collaborative housing (cooperative)
- Option D: Not linked to the housing sector
- Other, please indicate which:

8. How would you rate the following risks with regards to the implementation of circular approaches in the housing sector? (being 1, low risk and 5, high risk)

- Technical barriers and scientific uncertainties
- Low acceptance from the user of the new circular systems
- Low acceptance in the current housing plans and programs
- Poor development of the circular technologies
- High maintenance requirements
- Low acceptance of the products to be reused: reuse of water, nutrient recovery, etc.
- Very strict standards of legislation for reuse in the housing sector
- Lack of financing to stimulate required change involved
- None of the above
- Other, please add them:

9. How would you rate the following benefits with regards to the implementation of circular approaches in the housing sector? (being 1, low benefit and 5, high benefit)

- A change of paradigm in the housing sector towards sustainability
- Increased environmental awareness
- Optimisation of long-term costs
- None of the above
- Other, please add them:

10. In the context of the project we have identified some actors that we consider as key stakeholders that can be involved in the project. To what extent do you know the following organisations? (where 0 is that you have no relation and 5 is where you have a significant



relationship, where you share some project / initiative at the moment)

(different lists for: Austria, Spain and European contexts are provided)

11. For each of the following stakeholder categories, can you indicate other stakeholders with whom we should interact within the housing sector and circular economy?

- Technology suppliers
- Designers/Architects
- Public agencies
- Academic sector (research)
- Civil Society Organisations
- Policy makers
- Others, please specify

12. From the organisations mentioned above in the two previous questions, could you briefly describe how we could contact them on order to get them involved in the project? (through you, you could provide us with a contact, through contacts of yours, etc.)

(open ended answer)

About the Houseful project

The project aims to implement circular solutions and services in the housing sector. Within the project activities it includes the co-creation of solutions. This implies a high need for stakeholder engagement, therefore we would like to explore with you how we can achieve effective engagement.

13. From the following list of project activities, to what extent would you like to be involved for each one of them? (high interest / something from time-to-time / no involvement)

- Participation in the co-creation workshops for circular housing solutions (3 workshops in total)
- Other face-to-face meetings with a technical approach
- Online meetings, e-seminars, etc.
- Respond to interviews / consultations about the project
- Receive news about the project
- I do not have time / interest in being part of any of these activities

14. Now that you know about the Houseful project, what is the aspect that motivates you the most about the project?

- Participatory character - co-created solutions
- Application of the Houseful solutions in 4 pilot cases of the housing sector.
- The circular economy approach in the housing sector

General questions



We would like to acquire information of the profile of the person that has undertaken the questionnaire, and the institution that they represent, to ensure the scientific rigour of the investigation.

15. In which of the following groups would you best fit?

- Technology Suppliers
- Designers /Architects
- Public agencies
- Research centres / Universities
- Civil Society Organisations
- Policy Makers
- Other, please specify

16. Please provide the name of your organization

(open ended answer)

17. Location (country)

- Austria
- Spain
- Other, please specify

18. Gender

- Male
- Female

19. How old are you?

- 18 – 29 years old
- 30 - 49 years old
- more than 50 years old

20. Do you have any comments regarding this survey and the questions within it? Please write down your comments

Information about data processing

This questionnaire was developed by the Houseful project, your response and participation are very important for the development of the project as they will help us to analyze the social context of this project.

The HOUSEFUL project may contain certain personal information about you as part of our general project activities (such as your address and contact details, educational background, areas of expertise). We have become aware of your information in a number of ways - directly from you, from others or over time through our relationship with you - and may have received it and/or retained it in various forms (whether in writing, electronically, verbally or otherwise).

We use this information for a variety of project-related purposes only. For example, we need this information to identify participants for the HOUSEFUL events, for expert interviews and workshops, etc. For interviews and focus



group discussions, personal data will be kept in a protected file, separate from the users' anonymized responses. You can be rest assured that we will not use your personal information for commercial purposes. We take steps to ensure that your personal data is stored safely.

If you participate in the HOUSEFUL events, if you agree, your name, organisational affiliation and email address may be distributed and made available to other HOUSEFUL partners. This is necessary to achieve two of the main HOUSEFUL specific objectives:

- To achieve the implementation of an innovative engagement strategy to stakeholders involved in co-creation activities by using backcasting (a workshop methodology) exercises, and
- To raise the public and stakeholder's awareness by stimulating the acceptance and fostering the replication of HOUSEFUL services.

Stay in touch with HOUSEFUL; join our newsletter: <http://houseful.eu/news/>

If you wish to retract your personal data, please identify yourself and please contact us via email:
info@weandb.org

Again, thank you very much for the participation and for your time,

The Houseful team



Annex. 3 List of CEBOs

CEBOS			
Number	Name	Domain	Description
S0	SaaS – Software as a Service	Holistic	Aimed at evaluating building circularity, while offering different 11 circular solutions to stakeholders as innovative services to improve it, achieving an efficient management and use of water, waste, energy and material resources in housing sector.
S1	Service Definition of a new method for the analysis of Building circularity	Holistic	Focused on the development of an innovative methodology for the quantification of building circularity considering current management and use of water, waste, energy and material resources in all stages of housing value chain.
S2	Social engagement for co-creation	Holistic	Will provide capacity development activities for co-creation of new circular business opportunities to stakeholders in current housing value chain.
S3	Development of 4 Material Passports based on advanced 3D model	Materials	Focused on sharing data about materials used in new and existing buildings and their impacts on the environment in a digital format to stakeholders across buildings' value chain will be provided.
S4	Searching local building material	Materials	Focused on sourcing more than 50 types of building materials (existing or new commercial products) from secondary material platforms, databases and/or local producers, contributing to debate about quality, origin and potential material reuse at local scale.



S5	Efficient treatment and reuse of rainwater and greywater	Water	Greywater and blackwater can be separated with retrofitting measures in existing buildings. Greywater can be treated using innovative nature based solutions for indoor application in multi-level green walls with minimum energy cost (<1.5kWh/m3) and disinfected using commercial O3/UV systems for >90% water reuse.
S6	Efficient treatment and reuse of un-segregated water	Water	The liquid fraction of this combined waste water can be separated from the solid fraction using centrifugal force and gravity. The liquid fraction can be treated with NBS indoor, at facade and outdoor with a minimum energy cost (<1.5 kWh/m3) and allowing >95% water reuse. The effluent water can be disinfected (by using O3/UV) and used for toilet flushing, urban gardening and compost production. The solid fraction can be used for biogas production in a dry anaerobic digestion unit (Solution 8).
S7	Blackwater and Bio Waste treatment for biogas production	Waste	Based on the joint treatment of blackwater and grinded bio waste at building (pilot) scale for wet anaerobic digestion using AnMBR solution. The solution foresees the recovery of >95% food waste and >95% organic matter from blackwater.
S8	High quality fertiliser/compost of local origin	Waste	Stabilised blackwater from anaerobic digestion systems (AnMBR or dAD, Solution S7), will be used as compost for local gardening
S9	Optimal management of waste at the end of building life cycle	Waste	Focused on the analysis of maximum recovery and valorisation potential of existing materials in buildings at refurbishment or demolition stage, providing demolition guides



			to guarantee the best and safety management of waste streams.
S10	Improvement of energy efficiency by active and passive solutions	Energy	Energy improvement solutions such as envelope interventions, solar thermal systems, shared photovoltaic systems, etc will be proposed to reduce the energy demand of buildings and increase the share of renewable energies, contributing to reach Nearly Zero Energy Buildings.
S11	Guarantee the energy saving/production in buildings	Energy	Pay for performance business models are encouraged to be applied for installing energy technologies. For example, a pay per performance service applied to renewable energies can consist in that an energy service company supplies, installs and maintains a solar thermal (ST) or photovoltaic (PV) system, guaranteeing an annual solar production to the owner/tenants during the length of the contract.

